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THE OBERLAND

AND ITS

GLACIERS.

UNWIN BROTHERS, THE GRESHAM STEAM PRESS, BUCKLERSBURY, LONDON, E.C.

UPPER ICE-FALL OF THE OBER GRINDELWALD GLACIER.
Frontispiece.

The Oberland and its Glaciers:

EXPLORED AND ILLUSTRATED

WITH

ICE-AXE AND CAMERA.

B1950

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BY

H. B. GEORGE, M.A., F.R.G.S.

Editor of the "Alpine Journal."

WITH TWENTY-EIGHT PHOTOGRAPHIC ILLUSTRATIONS
BY ERNEST EDWARDS, B.A.

AND A MAP OF THE OBERLAND.

Rxa 7

London:
ALFRED W. BENNETT, 5, BISHOPSGATE STREET WITHOUT.
1866.

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PREFACE.

Books on Alpine travel and photographs of Alpine scenery have of late become so familiar to the public, that no suggestion for adding to the number of either would ever have been seriously entertained, had it not been for a belief that a new and useful combination of the two might be made. The writer has often found that people who have never seen a glacier, however keenly they may be interested in glacier theory for its own sake, and in mountain adventure on behalf of their friends, are unable to obtain any clear idea of what a glacier really is, except from elaborate *vivâ voce* explanation of Alpine pictures. Professor Tyndall's "Glaciers of the Alps," the most lucid in style of all works on glacier theory, was written mainly to enunciate an entirely new doctrine, and therefore contains much of argument and controversy, which are unnecessary for a sufficient understanding of the subject by those who are content to take one set of opinions on trust, without entering deeply into the controversy. Moreover no book on glacier theory yet published contains any large number of illustrations: they all aim chiefly at supporting by argument the views

entertained by the author, not at presenting the phenomena of glaciers before the eyes of the reader.

This being the case, the writer of the present work has thought that he might serve a humble, but useful purpose, by obtaining a set of photographs which should show as completely as possible the nature of glaciers and their various appendages, and by writing such an account of them as should supplement the effect of the pictures, and enable them to speak for themselves. Being himself an implicit believer in Professor Tyndall's theory of glacier motion, which everything he has observed during five years' acquaintance with the Alps has tended to confirm and illustrate, the writer has dealt with the subject as if Tyndall's theory were undisputed, merely making such mention of previous opinions as seemed necessary for a proper understanding of the subject. In adopting this course, the writer trusts that he will not be considered as disrespectful towards those eminent men who have adopted other views: his anxious desire has been to avoid controversy, and while frankly stating his own convictions, to abstain from advancing any arguments or opinions which are not either universally adopted, or derived from the distinguished man whom he is proud to acknowledge as his master in all Alpine lore.

In addition to the chapters relating entirely to the formation and functions of glaciers, matter has been introduced of two different kinds, which it is hoped may interest two different classes of readers. For the experienced Alpine climber there are narratives of two or three ascents of some difficulty and considerable

interest. For the less ambitious traveller there are accounts of a few expeditions of slighter calibre, which do not seem to be well known, and some hints which may perhaps be of service in enabling them to see sights and enjoy pleasures usually regarded as the exclusive property of mountaineers. There is a *lex non scripta* on such matters, more or less completely understood by the initiated, but entirely concealed from the general public, if one may judge from the unfounded ideas usually current; if a single party of inexperienced travellers is saved from discomfort and failure, by following the advice offered in these pages, one of the purposes with which they were written will have been fulfilled.

Before offering to such public acceptance as it may deserve this attempt to illustrate some of the grandest and most interesting of natural phenomena, the writer has one task to perform, which is at once a duty and a pleasure. He has received from Professor Tyndall not only his chief instruction in glacier theory through the admirable book already mentioned, but also many valuable hints for carrying out his purpose to the best effect; and he desires here to acknowledge with hearty gratitude not merely the important assistance he has thence derived, but also the kind personal interest taken by Professor Tyndall in this humble follower of his "Glaciers of the Alps."

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THE

BERNESE OBERLAND.

CHAPTER I.

THE START.

Ye are bound for the mountains—
With you let me go,
Where the cold distant barrier,
The vast range of snow,
Through the loose clouds lifts dimly
Its white peaks in air—
How deep is their stillness;
Ah! would I were there.—M. Arnold.

IT is a popular fiction that nothing is so difficult to find as a good travelling companion, and that unless the utmost care be taken beforehand in this respect, every tour is sure to be a failure. All the good qualities which the Baron of Triermain expected in his bride would not be too numerous for the exacting gentlemen who state their views on this subject in print. Possibly they might dispense with some of the personal charms which Sir Roland required, and which being a hero of romance he found in King Arthur's daughter, on condition of the paragon whom they honour with their company being acquainted with all the languages of Europe, and two infallible preservatives against the attack of fleas, that terror of all

stay-at-home tourists. On the other hand practical experience seems to show that average mortals, possessed of a common love for their objects of travel, will suit one another very fairly as *compagnons de voyage*, even if they meet casually as total strangers in a railway carriage or at a mountain inn.

It must be admitted that the facility with which persons, united by so faint a tie, can obtain release from the bonds of companionship tends to make the yoke sit lightly on their shoulders; and few would be willing to start deliberately for a long tour with a comrade not known to be in some respects congenial, however ready they might be to join some chance associate after starting alone. To choose one's companion beforehand, and arrange in concert the plan of the journey, is the safest and pleasantest way of doing business: but if this is for any reason impossible, no traveller need fear long remaining solitary against his will, or failing to find agreeable company on his way. A comrade picked up by chance may possibly prove a rare prize, or a decided failure; but on the average the lots drawn out of the wheel of fortune will prove something better than blanks.

It is otherwise where a large party intends travelling together for any length of time. The amount of trouble and arrangement requisite for every single movement is sufficient soon to convert their progress into a mere scramble, unless it is fully understood that some one consideration shall be paramount, or some one person be invested with the task of directing the whole. It is useless to lay down an elaborate scheme by common consent; for the chances of travel, bad weather or fatigue, incidental delays or miscalculation of distances, will infallibly reduce this to a chaos, and the whole work has to be reconstructed continually, with perpetual risk of disagreement. But if there be a central point of some kind, whether person or thing, some authority recognised as superior, the party becomes an organized

whole at once; while a large number has the further advantage that they can always agree to differ for a short space. If there are three eligible routes between two given places, it is hard indeed if one out of a party of nine or ten cannot find a second person to share his preference in favour of any one of them, and separating from the remainder for a day or so, rejoin them, to their mutual benefit in the way of comparing notes.

As, in working some mathematical problem, one at first assumes the moving body to be a particle without weight or size, and having calculated its course, applies the corrections required to suit the condition of the body actually moving, so we assume at the outset that each member of the travelling party is an atom self-contained and independent. Should the company comprise ladies, who will naturally belong in some way or other to the different gentlemen, the conditions of motion of the whole will be so materially complicated, that we may decline to work out the problem, but confidently leave it to solve itself *ambulando*.

At the end of August, 1865, there congregated at Grindelwald a party whose heterogeneous materials were united by a central element into a manageable and concordant whole, and whose movements were conducted on the principle of occasional divergence and reunion already referred to. The centre around which all else revolved was a photographic camera, and it was understood at starting that all other considerations must yield to the imperative requirements of business. The camera and its necessary attendants in fact constituted head-quarters, and moved in accordance with a previously decided plan of operations; and the manœuvres of all other components of the party were regulated accordingly.

The photographer himself may appropriately be designated by the Fenian title of Head Centre, since he supplied the brains to our

material centre, the camera, and with the two ladies accompanying him constituted the largest section of the party. Two gentlemen, each with a lady under his charge, described somewhat irregular orbits round our travelling *focus*; one of whom, in order to temper the extreme confidence of his neighbours, constituted himself croaker in ordinary—a most enviable post, since it ensured him the gratification of being successful either in his prophecy or in his undertakings. Two other gentlemen, qualified to advertise themselves as "without encumbrances," completed the number, one of whom was director-general of the movements of the camera, and consequently manager of the entire party, and the other his counsellor and occasional substitute in the task of superintending operations.

A despotism, tempered by the necessity not only of providing for all its subjects, but of explaining everything to their satisfaction, is by no means a sinecure; and the burdens entailed by it on the victim who found himself in effect courier to a party of nine persons, would not have sat so lightly upon him, had he not fortunately secured one of the best guides in Switzerland, Christian Almer of Grindelwald, who combines with first-rate mountaineering skill the most perfect readiness to undergo any trouble for the convenience of his *Herrschaft*. Almer being accompanied by his son Ulrich (a boy of sixteen, whose chief duties were to carry the legs of the camera everywhere, and to keep its master supplied with water), and the other guide of the party bearing the very similar name of Von Almen, all three were called habitually by their Christian names, to avoid confusion.

Instead however of dwelling any further on the individual members of the party, we may introduce them to the reader in bodily presence, assembled on the edge of the Unter Grindelwald glacier. The only absentees are the photographer himself, who found it impossible to be in two places at once, and Fritz von Almen, who

with great skill shifted his position at the critical moment behind one of the others, so that a leg only is visible.

In honour of the assembling of the entire party, the skies poured a libation which lasted for several days, broken only by an interval

ON THE UNTER GRINDELWALD GLACIER.

during which G—— and Christian Almer detached themselves to ascend the Jungfrau, and the remainder made a somewhat unsuccessful pilgrimage to Mürren. The bad weather was not without the advantage of enabling everyone to grow accustomed to the ways of everyone else, but was trying to the patience of those who remembered that while the photographic art is long, the life of an Alpine summer is short. The Adler Hotel at Grindelwald is an

admirable one in all respects but one—it scarcely possesses a book, a very serious exception in wet weather. One day somebody announced that she had ferreted out an odd volume of a work entitled "Christian's Mistake;" but it was so obvious that Christian, at least our Christian, was incapable of such a thing, that we voted the discovery a delusion. There were cards however for the evenings; and there was luncheon, a most useful institution under the circumstances, especially at the Adler, where bread, butter and honey are all perfect: and gradually the last days of August rolled away, until the first dawn of September ushered in a cloudless month.

Just about the time at which in England the first unfortunate partridges were falling victims, our camera began to bag its game at the foot of the Grindelwald glacier; and the work was continued with uninterrupted success, until the last days of the month brought us with happy coincidence to the close of our task, and to the end of our stock of plates.

The scheme with which we started was a simple one, and, thanks to the perfect weather, was carried out with tolerable completeness. We were to travel round the Oberland, commencing from Lauterbrunnen and Grindelwald, and thence working to the head of the Valais, were to make our way along its northern slopes, returning into Berne by the Gemmi. As many days as might prove necessary were to be spent in photographing on the various glaciers; and the experience of several previous seasons was brought to bear in determining beforehand the localities to be the most carefully explored, and the objects to be kept specially in view in each expedition. Further, the gentlemen were to seize such opportunities as might offer themselves for climbing high peaks, or crossing glacier passes; and all, ladies included, were to ascend as many of the minor mountains as might prove convenient. We thus hoped not merely to make a tour complete

in itself, though of no great duration, but also, by confining our attention to one district, to obtain a full and tolerably minute acquaintance with it, none of our time being wasted in long migrations from one centre of interest to another.

The map will show the routes actually followed, the continuous black line indicating the movements of the camera, and the dotted line the excursions of different sections of the party on their own account. It is founded on the excellent government map of Switzerland, with one or two small corrections supplied from our own actual observations. The mountain chains and glaciers are shown with some minuteness, but the minor ridges enclosing the lateral valleys &c. are merely indicated, with no pretensions to detailed accuracy. The nomenclature is that which has been recently adopted by the Swiss government, on the recommendation of a committee of the Swiss Alpine Club, specially appointed to examine and correct the nomenclature of the Oberland. In the forthcoming new edition of the sheet containing the lower half of the Oberland the names will appear as in this one, but no map containing these undoubted improvements has as yet been published.

The glaciers of the Oberland are very varied in their character, and the surrounding mountains so magnificent that there could be no fear of our losing interest in the scenery, while devoting our thoughts primarily to the diverse features of the glaciers themselves. Not only does the Oberland contain every type and size of glacier, from the Great Aletsch, unequalled in the whole range of the Alps, down to the tiny Maing glacier, which lies like a mere patch on the side of the Torrenthorn; but every phenomenon which has been observed, whether in the actual formation of the ice-streams, or in their effects and operations, is to be seen in perfection somewhere among the Oberland glaciers. Strongly persuaded of this, which turned out to

be a well-grounded anticipation, we determined to seek out in the Oberland, and as far as possible on certain selected glaciers, especially that of the Aar, the Ober Aletsch, and the two descending into the valley of Grindelwald, such a series of pictures as would give a tolerably clear and connected view of the origin and course of glaciers in general, and of the remarkable objects to be observed upon them.

The shortness of September days, and the difficulty of conveying the necessary quantity of water above the snow line, prevented our exploring at all fully the phenomena of the everlasting snow fields, or carrying the camera, as we had once hoped to do, to the summit of some important peak. But the glaciers, properly so called, were more within reach of our resources; and if we have failed to bring away sufficient and satisfactory pictures of all that calls for special attention upon them, the fault lies with our own want of skill, or with the imperfections from which the photographic art is no more free than its compeers.

The further objects of our tour were also carried out with tolerable success; and the necessities of our main purpose led us to make many excursions in a novel manner, which may perhaps prove worthy of imitation. But before proceeding to describe any of these we must, in order that their meaning and interest may be more fully appreciated, attempt to give some sort of answer to the preliminary question, "What is a glacier?"

CHAPTER II.

WHAT IS A GLACIER?

Ice upon ice, the well-adjusted parts
Were soon conjoined, nor other cement asked
Than water interfused to make them one.—COWPER.

NO popular phrase is more essentially false than "the regions of eternal frost," a term of tenemployed as a poetical synonyme for the higher portions of the Alps, where snow lies all the year through. The sun's rays have power to melt the snow there, as at lower elevations, and do in fact melt a very appreciable proportion of that which falls on the topmost pinnacles. The less the distance above the level of the sea, the higher on the average will be the temperature, and the greater therefore the fusion of the snow that falls in the winter; and a gradually increasing proportion of it will be found to disappear as we come lower down the mountain

side, until at length a line is reached where the amount that falls annually is just melted annually, below which the earth is during some portion of the year bare of snow. This level, which is called the "snow line," will of course vary from place to place, and from year to year, according to accidental circumstances, such as the direction in which the mountain slopes, exposing it more or less to the sun's influence, and the fluctuations of the weather. But on the average the snow line may be drawn in the Alps at about 8,500 feet; and of the snow that falls above this elevation only part will be directly melted by the sun.

What then becomes of the snow which falls in these high regions? For as the mountains do not in fact grow in height, nor the hollows between the peaks become more filled up, the surplus snow must be removed by some continuous natural agency. The avalanches which fall in spring bring down a little to the base of the mountains, where it is melted together with the native snows, so to speak, of the valleys; though, in consequence of the force with which it is compacted together in the fall, beds of avalanche snow are often found to withstand the heat nearly a whole summer. But the relief gained in this way is slight compared with the immense masses of snow deposited far from any precipice; and incomparably the most important agents in freeing the mountains from their burden of snow are the glaciers.

The outward analogy between a glacier and a river is so marked, and the phenomena attending the motion of a glacier down a valley are really so similar to those of a river flowing along its channel, that it is scarcely possible to speak of a glacier without using terms which apply originally to the flow of a liquid stream. A glacier *is* in truth a river of ice, having its source in some field of everlasting snow, and its termination deep down in some valley, far below the snow line, where in melting it becomes in its turn the source of some river of

ICE NEEDLES, UNTER GRINDELWALD GLACIER.

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waters. The motion of the ice has been carefully measured on various glaciers, and at different times of the year, and not only does the rate of motion vary in different glaciers in proportion* to the inclinations of their beds—just as a mountain torrent differs in speed from a river whose sluggish current is barely perceptible—but different parts of the same glacier move at various rates, the centre more quickly than the sides, and the surface more quickly than the bottom, laws which are also found to hold good with regard to running water. Moreover "the point of swiftest motion" on a line drawn across the glacier "follows the same law as that observed in the flow of rivers, shifting from one side of the centre to the other as the flexure of the valley changes."†

It may also be noted that it is usual in describing the neighbourhood of a glacier, to speak of its right or left bank, precisely as in the case of a river, meaning thereby the bounding ridge on the right or left-hand of an observer looking *down* the glacier. The reader who has never seen a glacier will find illustrations of its river-like flow in the foregrounds of the first pictures in Chapters V. and VIII.

An illustration is given on the next page of a phenomenon not unfrequently found at the edge of a glacier, which shows the motion of the ice so clearly, that the eye of imagination can almost see it move. The ice which forms the upper and left-hand portion of the picture was once in contact with the rock, and in its advance still retains the form to which it was moulded by that contact; the concave outline of the ice

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* It is hardly necessary to add that this is only one among several causes which combine to determine the rate of motion of each glacier.

† Tyndall's "Glaciers of the Alps," p. 423.

GLACIER MOTION—ICE AND ROCK.

precisely coinciding with the convex shape of the rock, some slight allowance being made for subsequent superficial melting of the ice.

The fact that a glacier does really move like a river, and that the analogy which suggests itself to every observer on first beholding a glacier is not merely fanciful but true and close, has been established

beyond the possibility of doubt by the successive labours of scientific men, all of whom agree in their opinions so far, however they may differ in respect of other topics arising out of the theory of glaciers. But the further questions immediately suggest themselves: first, how does the snow which falls high among the mountains become converted into ice; and secondly, what is the force capable of making solid ice thus flow in streams down the valleys? The same agency will be found to have mainly conduced to the attainment of both results, but in a somewhat different manner; and it becomes consequently necessary to discuss each question separately.

How then does the powdery snow, which once fell on the mountain top, become transformed into hard and perfectly solid ice,* such as it appears to be at the foot of the glacier? Snow is, as everyone knows, nothing more or less than frozen water, that is to say ice, but in an outwardly different form. A flake of snow consists in fact of minute particles of ice, so loosely joined together that a great proportion of air is enclosed in their interstices, which causes the snow, in its own ice-particles necessarily transparent, to appear white and opaque. This white appearance results from an established law of light; and a more familiar illustration of the same law may be found in rock-salt, or carbonate of soda, which in the lump is transparent, but when reduced to powder is white. Similarly a lump of ice, if scraped, becomes an opaque powder, closely resembling fine snow. The change in colour which snow undergoes in becoming ice, is precisely the converse of the change undergone by the salt on being scraped into powder; and hence we may naturally infer the nature of the actual change in the substance. All the air which originally

* See the ice in the photograph on the opposite page, which was taken very near the foot of the Unter Grindelwald glacier.

was mixed with the particles of ice to compose snow is expelled, and there being nothing left but the ice, the mass is of course transparent.

Two agencies operate to remove the air from amid the snow, one of which, the earliest to act on it, and the least powerful in its effects, has been already mentioned in another connection. The sun, as has been said, melts during the summer the surface of the snow, and the water thus formed penetrates downwards into the mass, warming the snow as it passes through it, but at the same time losing part of its own volume, which is frozen on to the tiny grains of snow, thus increasing their size, and uniting several of them into one larger grain. As this process is continued day by day and year by year, the lower layers of the snow lose more and more air, and the whole mass becomes less in bulk, but much more dense, the upper surface having in fact by the process described been transferred downwards, and made to fill up the interstices in the lower parts. In this condition it closely resembles in appearance a mass of small hailstones frozen together, and is usually known by the French term *névé*, or sometimes by the equivalent German name *firn*. Though this process of superficial melting, and subsequent refreezing of the water so produced, is capable of transforming snow into névé, yet it is ineffective to produce the further change into genuine ice. A good instance of the utmost change which can be wrought by this means alone may be found in the small Maing glacier, on the north side of the Torrenthorn, which appears in the foreground of the view from that mountain given in Chapter VIII. Its upper portion, which is plainly exposed to very little influence of any other sort, is névé of an unusually solid kind, and has lost, as completely as the surface of most glaciers very far from their origin, the brilliant white colour which belongs to snow, and which gradually dies out as the substance grows less and less like what it originally was.

But there is another and far more important agent at work, namely *Pressure*, which materially helps in converting snow into névé, and does the whole of the work necessary for further changing névé into the true ice of the glacier. The superincumbent mass by its weight keeps up a constant pressure on the lower layers of snow, squeezing the air out of them at the same time that the water from above is trickling through, and depositing fresh ice over the surface of the grains already formed. And the pressure is applied not only vertically by the weight of the mass above, but laterally from the sides of the valley through which the glacier flows, and from the snows which, accumulating behind, force the glacier down, as we shall see presently is the case. This process, continued throughout the whole length of a glacier, finally expels all the air, and brings the ice to a state of perfect transparency. The sight however of the lower end of a glacier is apt to disappoint the traveller, unless he approaches near enough to examine the ice closely, or penetrates into one of the caves which usually are found at the foot of a glacier, and form the source out of which rushes the nascent river. The upper surface of the ice has necessarily been exposed to comparatively little pressure, and is constantly being disintegrated by the sun, besides being strewn with dirt, through the operation of causes not yet referred to. Thus it is impossible for any pictures of the end of a glacier to convey an idea of the perfect clearness and exquisite beauty of the ice.

It has already been observed incidentally that pressure is the agent which drives glaciers down the valleys; and though much controversy has arisen as to the causes which govern the motion of a glacier when formed, yet it will be allowed by all alike that pressure, in the weight of accumulating snows, forces out the lower portions of the mass, and compels them to find place for themselves in

whatever direction they can escape, which will obviously be where valleys open downwards from the great reservoirs of névé. Streams of ice thus started flow down valleys of every imaginable shape and size, and of constantly varying width and inclination, accommodating themselves accurately to every change in the form of their bed, and always preserving their continuity. Below the snow line, where the sun during some portion of the year has power to melt their true surface, no longer hidden beneath a cloak of fresh fallen snow, they begin to diminish in thickness; and this wasting away proceeds with increasing rapidity as the glacier descends further, until at length a point is reached where the amount of ice pushed down from behind is not more than the sun can melt, and there the glacier terminates.

The glacier as a whole, it has been said, preserves its continuity throughout; that is to say, it is never found actually riven into two separate parts. But its substance nevertheless is seen to be cleft and broken at different parts of its course by fissures of very various size, shape and direction, which are termed *crevasses*; and it is mainly upon the observation of the manner in which these crevasses are formed, and of the relation they bear to the changing conditions of the glacier's bed, that the theories have been founded which have successively professed to explain the causes of glacier motion. Before therefore entering into any description of the various kinds of crevasses, which mainly contribute to the beauty of the glaciers they intersect, it will be desirable briefly to state the chief theories that have been adopted, and especially that of Professor Tyndall, which in the eyes of the great majority of scientific men has distinctly superseded all others.

The earliest attempts at forming a glacier theory were made in the last century, and before Englishmen had begun to interest themselves in the matter. The first of these, suggested by Scheuchzer

so long ago as 1705, but generally associated with the name of Charpentier, was that the freezing and consequent expansion of water within the glacier furnished the force which urged the glacier downwards; but even if this were sufficient to account for the phenomena, subsequent experiments have supplied proofs that such freezing does not take place to any great extent. Another theory, bearing the honoured name of De Saussure, was that the glacier simply slid over its bed, a proposition which is true up to a certain point, but only removes the difficulty a step further off.

The first Englishman who devoted any time and thought to the study of glaciers was Professor J. D. Forbes, then an ornament of the Edinburgh University, but now Principal of St. Andrew's. He was the first to make trustworthy and systematic measurements of the motion of glaciers, and to prove beyond question that the ice-stream does really move in very close analogy to a river. From this demonstrated similarity, which has scarcely been disputed since, and the facts of which have been followed out still more minutely by subsequent observers, Professor Forbes founded his celebrated theory, that a glacier is an imperfect fluid, or viscous body, and that its motion is caused by the laws which govern all such bodies. A more admirable illustration of the nature of glacier motion could not be found than this comparison with a stream of honey, lava, or tar; but it is so obvious that ice in small portions is not only not viscous, but is a remarkably brittle solid, that the analogy between the substances breaks down, whatever the resemblance that undoubtedly exists between their modes of motion. This theory was the subject of much controversy, and many able arguments were set up for and against it; but on the whole the balance of opinion seemed to tend in favour of Professor Forbes' theory, in spite of the difficulty admitted by himself, that viscosity

could not be traced in the icy fragments of a glacier, any more than in ordinary lake ice.

In 1856 Professor Tyndall was induced by other considerations to turn his attention to the Alps and their glaciers, and in the course of a few seasons not only made himself practically acquainted with all the phenomena of glaciers, and became one of the boldest and most skilful climbers in England, but also executed a series of measurements, which added much to the foundation laid by Forbes. Out of these observations, with the aid of experiments at home, he elaborated a theory of glacier motion, simple, complete, and not only consistent with all observed facts, but capable of explaining them satisfactorily. This theory he gave to the world in "The Glaciers of the Alps," one of the most delightful books that ever appeared on a scientific subject, which has practically become the text-book for all who have taken up the study of glaciers since the date of its publication.

Tyndall's theory may be summed up in the single word Pressure. He shows conclusively that ice, though it is incapable of yielding in any perceptible degree to tension or strain, yields to pressure in a most marvellous manner, and can in fact be moulded by means of pressure skilfully applied into any conceivable shape. It must not be supposed, however, that the ice does not break under pressure; on the contrary, it is broken in every direction, but re-unites itself by virtue of the remarkable principle discovered by Faraday, and now termed Regelation.

This property of ice, which is in fact if not in theory familiarly known to every one, is that when two pieces of ice with moistened surfaces come in contact, they become united by the freezing of the thin film of water between them, though no such result follows the contact of two pieces of dry ice. Every snowball depends for its

formation on regelation, the moist particles of snow freezing solidly together in consequence of being pressed into contact: and if the pressure applied be tolerably severe, so as to squeeze out most of the air and bring the particles into very close contact, the snowball becomes semi-transparent, and in fact imperfect ice. On the same principle depends the fact that in general the nearer the temperature approaches to the freezing-point during a snow-storm the larger will be the flakes, and the lower the temperature the smaller they will be. The flakes are of course formed above the earth, where we cannot observe the temperature, and other agencies, such as wind, doubtless tend to prevent or assist their formation: but on the average the law indicated holds good, and depends on the fact that at the freezing-point each flakelet will be just beginning to melt, will therefore have moistened surfaces, and will consequently adhere by regelation to any other that comes in contact with it. Another and somewhat destructive instance of the working of regelation may perhaps be remembered by some readers. During the first heavy snow-storm of last winter, the telegraph wires in many places about London were torn down by the weight of the snow which became attached to them. Throughout the fall the temperature of the air was never much below the freezing-point, and was sometimes above it: thus the conditions were most favourable for the building up of masses of snow by regelation, and the snow grew round the telegraph wires until in some places they were coated as thick as a man's wrist, and in other places they broke beneath the load.

The origin of regelation itself—that is to say, the physical cause which produces the observed phenomena—cannot be said to have been yet satisfactorily decided, two rival theories being supported by high scientific authority. Professor James Thomson refers regelation to the mutual pressure of the two pieces of ice; Faraday, the original

discoverer, to a mutual action between the ice and the film of water, inducing the crystallization of the latter. Experiments have been made which would almost seem to demonstrate the insufficiency of Thomson's theory; on the other hand Faraday's explanation, if correct, still requires to be carried a step further. But whatever the cause of regelation may be, the fact is indubitable, and a knowledge of it is essential to a clear understanding of glacier motion.

Moisture being necessary to regelation, being in fact the cement with which the pieces of ice are united, it is only when the ice is at a temperature of 32°, or just beginning to melt, that regelation can take place, unless the surfaces of ice be extraneously moistened. At that temperature also ice can be crushed with facility by the application of a moderate pressure, whereas when colder it is much harder. Such experiments as have been made tend to show that the interior of a glacier is always at or near the freezing-point, at least in summer: and this belief is supported by other considerations, drawn from the observed facility with which the glacier as a whole yields to pressure, and from the known powers of ice in respect of conducting and absorbing heat. Thus the ice of a glacier is brought by the operation of totally independent causes into the precise condition most favourable for its being moulded under the influence of pressure and regelation. There is no waste of those forces in overcoming resistance, arising from the ice not being in the fittest state for their application.

The rate at which a glacier moves is determined by the simultaneous working of a variety of causes, more or less independent of each other, such as the shape of the valley, its inclination, the amount of névé exerting a pressure from behind, and the changes of the seasons and weather, all of which vary infinitely in themselves. Thus it is impossible to obtain any definite law, whereby we can discover the

rate of motion through knowledge of the various conditions affecting the glacier. Actual observations have however determined the rates at which numerous glaciers move in summer, and one or two such measurements have been made in winter; and though the results are, as might be expected, by no means uniform, yet it may safely be said that very few glaciers move faster than 700 feet per annum, while many advance much more slowly.

The winter rate is on the average half that in summer, though the observations made in winter have been too few to determine whether the glacier ever moves at any much slower pace. It will naturally be asked why the motion varies with the seasons—why, since the pressure from behind must always be kept up, the glacier does not move uniformly. The explanation is to be found in the very fact which accounts for the fullest and most complete motion. In summer the ice, as has been already mentioned, is throughout at a temperature of 32°, in which condition the ice is most readily crushed and regelation can work most effectually. In winter the surface and the mass of the glacier, to a depth necessarily unknown, are frozen to a much lower temperature; the ice is consequently harder, and does not yield so readily to the pressure exerted upon it. Moreover the under surface of the ice is melted in summer by its contact with the warm earth, and the streams of water thus formed act like grease to diminish the friction and facilitate the sliding of the glacier over its bed: in winter on the contrary no such melting takes place, and the amount of friction is far greater, whereby the rate of motion is considerably diminished.

It will now be easy to trace the course of a glacier, the manner in which the crevasses, of various kinds, are formed and obliterated, and the processes by which the internal texture of the ice is modified. We have already seen that in its descent from the snow reservoirs high

among the mountains, the substance of a glacier becomes gradually denser, and is transformed from névé into actual ice, and that this change is due to pressure from various directions. Concerning the mode of this transformation something more must be said in the sequel: but since the phenomena of crevasses are the same at all stages, and no definite point can be fixed at which the névé may be said to become ice, it will be desirable, in order to avoid confusion, to make use of one term only, while speaking of the substance of the glacier, merely premising that what is said of ice is equally true of névé, unless special exception is made.

The conception of a river of ice, which has been set before the reader as giving the best idea of the nature of glacier motion, will probably have suggested a steady and equable flow down a channel of tolerably uniform inclination; and hitherto there has been no occasion to suggest any divergence from this pattern, to which in fact many glaciers conform. But now we must begin to consider the effects which will be produced by variations in the width, steepness and direction of the valley forming the glacier's bed. To fix our thoughts, let us imagine a glacier starting out of a huge reservoir of névé, driven down by the pressure of the mass behind it, and flowing in the only channel which affords it room to escape. What will happen when the glacier, after flowing gently down for some distance from its parent basin, reaches the brow of a steep declivity, due to a great and sudden change in the inclination of the valley which contains it? The front portion of the ice, being thrust over the edge, and being unable to resist the strain caused by its own almost unsupported weight, breaks across the brow. But in consequence of the upper part of the ice moving more quickly than that near its bed, the crack will not penetrate through the entire mass. As the top of the slice thus partially detached is tilted forwards, the bottom of it will be

THE RHONE GLACIER.

To face page 23.

pressed more violently than ever against the ice behind; and so the slice, never totally divided from the remainder, is gradually pushed down the slope. Very soon another portion of the surface reaches the brow, is similarly broken and driven downwards, and so on in endless succession. Human eye has of course never seen the beginning of such an infinite series of ice-waves, but the only difference between the first wave and any subsequent one arises from the latter encountering at the bottom of the descent the resistance of its predecessors, which having reached a more gentle slope are again moving forward as above the steep fall.

There is nothing more wonderfully beautiful in the whole range of glacier phenomena than the sight of one of these ice-falls, as they are most appropriately termed. The number of them is of course extremely great, the same glacier often possessing two or three; but scarcely one in the wide extent of the Alps is superior in grandeur to that of the Ober Grindelwald glacier, which forms our frontispiece. This marvellous cascade of ice is about 400 yards in width at the top, and not much short of 2,500 feet in vertical height, and is framed in black precipitous rocks, with the dark stern peak of the Schreckhorn frowning overhead on the right.

At the bottom of the same picture the glacier is seen again flowing onwards in comparatively smooth and unbroken condition: and the same thing may be observed with even more distinctness in the accompanying view of the Rhone glacier, where the ice-fall though less steep is almost equally broken, and the surface below it more nearly level. How has the glacier, after being riven in every direction at the fall, and poured in a cascade of icy fragments down a descent of 2,500 feet, again become compacted into a homogeneous whole? The agent which has effected this magical result is merely the resistance of the

mass below the ice-fall, which having a comparatively gentle slope to descend refuses to give way, except to severe pressure from behind. Supposing a square-cut slice of the glacier to reach the bottom of the fall, its upper edge will first come into contact with the ice in front, and will by the pressure from behind be reunited to it through regelation. As the slice works its way down entirely on to the gentler incline, it brings its lower parts also into contact, and in the effort to find room for itself the whole becomes reunited to the mass in front. The same process is repeated with every successive slice of the glacier, into whatever shape it may be split by the accidental shape of the ice-fall; and so the glacier goes on its way below the fall as if nothing had happened.

At every change in the angle of inclination of its bed, one of these two processes is repeated; when it becomes steeper, the glacier is visibly broken across, as every successive wave reaches the angle; and when it becomes less steep, the crevasses previously existing are wholly or partially obliterated by the resulting pressure. It is from observation of these effects, produced by very slight changes in the inclination, that Professor Tyndall deduces his conclusion that a glacier, like its component ice, is incapable of bearing any perceptible strain, and is therefore not in any sense a viscous body. A specially good instance of these successive changes, slight in themselves, but producing marked results, is to be found on the lower part of the Unter Grindelwald glacier, between the Eismeer and the final fall.

It is not to be supposed that when the glacier reaches a gentler slope, after passing down a fall, the crevasses formed in the fall are always, or even usually, obliterated. Sometimes every trace of them is destroyed, and the surface becomes really smooth and uniform: sometimes a fresh change of inclination occurs so speedily that it is

hard to tell whether the crevasses there appearing are new, or the old ones which have never entirely closed. In general however the successive waves of the ice-fall are very clearly visible for a long distance below its termination; and the sun gradually wastes their angular outlines until they assume a rounded shape very similar to that of ocean waves, as may be seen in the accompanying illustration, which represents a portion of the surface of the Aar glacier, the wave forms being the result of the grand ice-fall under the Finsteraarhorn.

WAVED SURFACE OF THE AAR GLACIER.

Further on, let us suppose two valleys, each containing its glacier, to meet at an angle, and form one larger valley. The two glaciers of

course are brought into contact, and obedient to the law which welds into one two masses of ice duly pressed together, flow onwards in an united stream. And though their line of junction may often be traced down the entire length of the united glacier by means of the moraines (a phenomenon to be explained hereafter), yet no division can be discovered in the ice, which becomes truly one stream. An instance of such a junction may be seen in the illustration facing p. 109, where the glacier descending straight towards the spectator joins with another flowing from his left hand, and the two flow thence in a common stream, the commencement of the line of junction being marked in the picture by the black line of moraine across the foreground.

Sometimes, as may be seen in the illustration at p. 78, two glaciers meet in this manner at the top of an ice-fall, and pour over the brow together, in which case every trace of their ever having had a separate existence is usually obliterated by the time they reach more level ground. In the same picture may also be seen another instance of the manner in which two glaciers unite. A huge black rock breaks the continuity of the ice-fall, and the glacier is obliged to flow in a divided stream to the right and left of it; but immediately after passing the obstacle, the two branches reunite. Frequently also a glacier descends in a steep fall laterally into a valley already filled with another glacier more gently inclined, as may also be seen in the illustration last referred to. In this case there is usually some confusion at the point of junction, the smoother surface below being torn by the sudden lateral invasion: but in a short distance, through the operation of the steady pressure from behind, all is again as even as before the disturbance.

When an ice-fall is very steep, the glacier is usually broken in every direction, losing all traces of the successive waves which formed the fall, as is the case in that shown on the frontispiece. If the

inclination is not so great, but at the same time other of the crevasse-forming agencies are in operation, each wave will often be broken across in a direction parallel to the length of the glacier, forming thereby fragments of a rudely rectangular shape. These masses of ice are termed *séracs*, from a patois word for a particular kind of thin cheese which resembles them in form and colour; and a specimen of them may be seen in the illustration at p. 78, on the right of and under the ice-fall. The heat of the sun speedily rounds off the corners and otherwise alters the shapes of these séracs, so that at a little distance from the spot where they were formed, it is difficult to understand how such fantastic towers and pinnacles can have been produced, much more to trace in them the working of the law to which undoubtedly they owe their existence. Partly in consequence of this change, and partly also for want of any other convenient word, the term sérac is used to denote any irregularly broken ice; but it is properly applicable only to the upper regions, that is to masses of névé, not of ice. The séracs formed at any given point will usually be again compressed into a comparatively smooth and uniform mass in the subsequent course of the glacier: but when such a formation takes place low down, and no return of a gentler inclination causes them to disappear, the blocks of ice gradually waste away, and assume a pointed shape, not so fantastic perhaps as some of the forms to be seen among the névé, but even more beautiful, from the greater transparency of their substance. Of these "spires of ice" a specimen may be seen in the accompanying illustration, one among hundreds of similar groups to be seen on the Unter Grindelwald glacier.

Hitherto we have been considering the crevasses formed by the general motion of the glacier, without considering any of the effects due to differential motion, that is, to the greater speed of parts relatively to the remainder. Now however we must revert to the

simile of a river, and recall the statement made at the outset, that the centre of a glacier moves faster than its sides, just as the water moves in a river. The cause of the retardation of the sides is of course the friction of the ice against the bounding rocks; and its immediate result is, that the ice at the sides being pulled forward by the more rapidly moving centre, and being unable to stretch in the least degree, breaks *across* the line of strain; that is to say, a series of crevasses are formed, running from the edge obliquely *up* the glacier. The first natural impulse, on noticing this phenomenon, is to infer from it that the sides move the fastest, especially when a series of *marginal* crevasses, as they are called, form on each side of the glacier, and are connected through some slight simultaneous change of inclination by a set of transverse crevasses. The early observers seem to have been misled in this manner; but the appearance was proved by Forbes to be deceptive, and the fallacy is at once exposed, on Tyndall's theory, by a consideration of the mechanical laws already stated which create these marginal crevasses.* The formation of crevasses at the top of an ice-fall is also materially aided by the motion of the surface being swifter than that of the bottom, the latter being retarded by friction against the bed of the glacier; but this agency can scarcely be said itself to produce crevasses, though it clearly accelerates the formation of them, inasmuch as the breaking strain is more speedily applied.

Every detail in the shape of the valley down which a glacier flows has its own effect in occasioning crevasses. A projecting rock will

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Mr. Hopkins was the first to work out this mechanical law; and he showed conclusively that in a straight glacier the greatest strain would be obliquely downwards at an angle of 45° to the bank, and that consequently the ice ought to break, as it is observed to do, at the same angle to the bank, but upwards.

sometimes almost stop the motion of a small portion of the ice, and cause the marginal crevasses to assume unusual width and complication. Similarly, if the valley be curved, the ice on the outer side has to perform a considerably longer journey than that on the inner side; and the forces influencing each part, in the way of pressure from behind and friction against the side, being more or less equal, there is a much greater strain on the outer side, and the ice consequently breaks in a series of wedge-shaped crevasses, while perhaps the opposite side of the glacier is being compressed. The same result is furthered by another cause already mentioned: the most rapid motion, as Tyndall has demonstrated, takes place in the centre if the valley be straight, but if it be curved, at some point *outside* the centre line. Thus the strain arising from the speedier motion in the middle of the glacier comes with increased force on the ice of the outer edge.

When a valley suddenly becomes narrower, the mass of the glacier is necessarily squeezed violently together, in order to find room to pass, and this naturally produces irregular dislocations of its surface, some parts being apparently piled up above others. Then, as soon as the defile is passed, and room afforded for the glacier again to expand laterally, there will be a tendency to split in a longitudinal direction, if there be more than sufficient space for the ice to lie in its natural breadth. A good instance of this is visible in the illustration at p. 87, where the Unter Grindelwald glacier, after being squeezed through a very narrow opening, makes its final descent without any great lateral compression.

Finally, if the end of a glacier has free space to spread, and descend into a comparatively level valley, considerable resistance to its advance will be made by the ground in front, while its own weight will tend to drag the ice towards the sides, where there

is no counteracting pressure. Thus crevasses will be formed, which at the actual termination will be parallel to the axis of the glacier, and at other points round the lower end of the glacier will run inward, at an angle to the central line, the whole exhibiting a fan-like arrangement. The best instance of this is the Rhone glacier, and the crevasses formed round the whole end of the glacier can be clearly traced in the illustration already given.

Crevasses being so numerous, and being opened and re-closed so continually in the descent of a glacier, it might perhaps be expected that travellers would have frequent opportunities of observing their actual formation. This, however, is by no means the case, although the cracking sound which announces the birth of a crevasse must be familiar to every one who has spent much time on glaciers. At their first opening crevasses are barely visible, frequently so small that a penknife cannot be thrust into them, so that it requires very sharp observation to catch sight of the imperceptible crack which announces that a strain has been put on the ice. Occasionally a crevasse will open beneath the traveller's actual feet, but the chances are of course greatly against such an event, and any one who has had the good fortune to see as well as hear it must be regarded as exceptionally fortunate.

CHAPTER III.

THE JUNGFRAU.

The form
Of the high mountains cleaves the clouds asunder,
And soars into far realms of fear and wonder,
And howling wildernesses where the storm
Goes darkly with its thunder.—F. TENNYSON.

IF there is a mountain in Switzerland to which the saying that "distance lends enchantment to the view" is strongly applicable, it is the Jungfrau as seen from the north. Enchantment, in the poet's original context, doubtless meant little more than beauty; and in this sense the remark is true of nearly all mountains. The stricter meaning of the word, however, the notion of investing an object with an apparent form and character not really belonging to it, gives the line quoted a special significance as regards the Jungfrau.

Swarms of travellers cross the Wengern Alp every day of every summer, gaze up with admiration not unmingled with awe at

the frore mountain wall,
Where the nich'd snow-bed sprays down
Its powdery fall,

and pass on with the impression that the northern face of the Jungfrau is one gigantic precipice. Many imagine that the avalanches, which add such grandeur and sublimity to the scene, descend from the very summit of the mountain; and those who observe that they in fact fall from a sharply defined line some way down, suppose that this is merely the outward edge of a narrow shelf, scarcely wide enough to interrupt the continuity of the precipice. It is the general impression, and even Mr. Ball's "Alpine Guide" bears traces of the idea, that to cross the face of the mountain, if not impossible, must involve frightful danger from avalanches—danger which no climber ought to encounter even in striving after so tempting a prize as the Jungfrau from the Wengern Alp.

Yet in truth there lurks behind this well-marked edge a broad plain of névé, almost level, cleft by scarcely a crevasse, and as free from risk of avalanches as the Wengern Alp path. It was this plateau, somewhat difficult of access, but perfectly easy to traverse when attained, which alone rendered possible the ascent presently to be recorded: and the secret of its existence has scarcely yet been widely divulged, though known to a few persons since 1863, when MM. Von Fellenberg and Baedeker passed along it to ascend the Silberhorn, the outlying tributary peak on the north-west of the Jungfrau.

Still more remarkable is the fact that the real summit of the Jungfrau is entirely invisible from the Wengern Alp, though tourists are deluded by guides and innkeepers into the belief that the top of the great black precipice which stands out so grandly against the sky is also the top of the mountain, and climbers occasionally indulge in rhapsodies about looking down from the Jungfrau upon the green expanse of the Wengern Alp, a feat which would be highly interesting if it did not happen to be impossible. In reality an undulating snow-field extends for some little distance back from the top of the precipice,

on the further side of which a steep pile of rocks, the real summit of the Jungfrau, rises two or three hundred feet. This is plainly seen to be the case from Thun, and in a minor degree from Interlaken; but as mountaineers rarely visit those pleasant Castles of Indolence except in rainy weather, and other travellers seldom care to observe details so minutely, there is little difficulty in accounting for the world in general believing the fictions they are told on the Wengern Alp.

Of all schemes for assailing the Jungfrau from the northern side the most daring was that of Messrs. Hornby and Philpott, who actually scaled the precipitous northern face of the Silberhorn,* and descended to the lowest point of the ridge connecting that peak with the Jungfrau, intending thence to attain the object of their ambition by continuing up the re-ascending line of the same ridge. This bold and ingenious plan, which would have taken them up the Jungfrau by a route every step of it new, failed through bad weather; and they were compelled to descend to the Wengern Alp by the way we afterwards ascended. Christian Almer, who had been their leading guide, on coming soon afterwards to join us, began immediately to drop hints about the extreme desirability of our making a similar attempt: after the successful issue of the expedition he confessed to having made up his mind, at the moment when the first party under his guidance was forced to turn back, that the other of his most constant employers should accomplish the design then left unfulfilled.

That every Sunday in the Alps is fine is a rule which admits of very few exceptions; and certainly the last Sunday in August, 1865, was not one of them, for no more cloudless day ever followed thirty hours of continuous rain, or tantalized a mountaineer having a

* A narrative of this expedition, written by Mr. Hornby, appeared in the Alpine Journal for March, 1866.

predilection for spending Sunday peaceably. The important question for us was whether this would prove to be, like many of its predecessors, a mere oasis in the desert of bad and doubtful weather, or the first of a long series of equally glorious days. September in the Alps is the most usually fine of all the summer months, and Christian had been constant to his predictions of a permanent change for the better, as soon as *Herbst** arrived. Was this an anticipation of September, or had we yet five days to wait for settled weather? The people of Grindelwald were almost unanimous in pressing on us the former alternative, and we accepted the conclusion readily enough, the wish perhaps being father to the thought. Although our expectation proved groundless, yet our wish had no great reason to be ashamed of his progeny, since the interval of fine weather lasted just long enough to seal the fate of the Jungfrau.

Arrangements were made for the ascent of the party *en masse* to the Wengern Alp next morning, whence, after the requisite amount of photographing, and an expedition up the Lauberhorn, all except the Jungfrau detachment were to proceed onwards to Lauterbrunnen and Mürren. Christian, who had insisted on keeping secret our designs on the Jungfrau up to the last possible moment, also made his selection of men to accompany us under his leadership. Formidable preparations being necessary to meet the contingency of spending a second night *sub Jove frigido*, he engaged, in addition to Hans Baumann, his favourite second among all the Grindelwald men, three porters, two of whom were to return from the scene of our first bivouac, and the other, his own half-brother Ulrich Almer, was to accompany us throughout. As all supplies could readily be obtained at the Wengern Alp, there was no necessity for taking any-

* The colloquial German name for September.

thing whatever up from Grindelwald; and the addition to our already imposing cavalcade of five able-bodied men carrying no burdens was a subject of much astonishment both to the few travellers we encountered, and to the natives, none the less because Christian and his satellites preserved a mysterious silence as to their destination. G— being the only one of our immediate party prepared to undertake the Jungfrau expedition, he sought an associate for it in a gentleman who had chanced to join him in one or two previous excursions, and who on all occasions had proved himself a thoroughly agreeable companion and a most skilful climber.

Having seen the others depart towards Lauterbrunnen, and held the usual conference with Christian as to the ordering of supplies, we sat down to the usual midday *table d'hote* at the Wengern Alp inn, the only Englishmen in a large company, to enjoy our last regular meal for forty-eight hours. Dinner over, we adjourned to the bench outside, where packing had been already begun on our behalf, and was being watched with the utmost astonishment by the numerous French and German tourists who were sitting there to drink their post-prandial coffee. As firewood and saucepan, bottles and rugs, paper parcels obviously containing eatables, and two wineskins were successively stowed away in the capacious baskets used in the Oberland for conveying miscellaneous cargoes, the curiosity of the spectators increased; and at the sight of a young fir-tree being added to the pile, two or three of them, unable to resist any longer, began to question the men, and did not appear much the wiser for the answers they obtained. No one seemed to suspect the two peaceable Englishmen, without even an alpenstock, who sat looking on in apparent unconcern, of being the real authors of all this bustle, until Christian came in despair to inform us that there was little or no bread to be had, a piece of information which naturally

roused us to go and inspect our stores. As we returned to our seats, having thus disclosed our interest in the proceedings, a storm of queries burst upon us, suggesting forcibly, but for the greater courteousness of the forms of speech, the mode of interrogation delighted in by the conventional Yankee. Which way were we going? Where were we intending to sleep? But wasn't that among the ice? When did we expect to reach the top of the Jungfrau, this evening, or to-morrow? How many guides apiece had we taken? Did Monsieur really mean that he was going to spend the night in the open air? We answered these and many similar questions to the best of our power, explained the use of the rope and the intended destination of the fir-tree, and then escaped into the house to assume gaiters and ice-axes, and to pay the bill.

The people who keep the excellent little inn at the top of the Wengern Alp had a very lively recollection of a certain expedition* in 1862, whereof Christian Almer was the leading guide and G— one of the *Herrschaft*, which, by establishing the Jungfrau Joch as an available pass, had brought them in subsequent years many and profitable customers. Gratitude, in the double shape of remembrance of that long past service, and of a keen sense of the advantage to be derived from our present undertaking, probably may have had something to do with the extreme moderation of the bill, which only amounted to about 48 francs, though five men were amply provisioned for two whole days, and two more for twenty-four hours, and not a few useful articles were lent to us. Just in the nick of time a lad appeared with a load of bread, which he had brought from the other inn, a mile or so off in the direction of Lauterbrunnen; and our stores

* An excellent narrative of this expedition from the pen of Mr. Leslie Stephen will be found in the Alpine Journal, Vol. I, p. 97.

being thus completed, we started about a quarter to two, amid a chorus of parting salutations and wishes for our success.

Our route up to the place where we spent the night can be traced on the accompanying illustration, from the point where we reached the base of the Mönch, and is also marked on the map. On leaving the Wengern Alp inn, we walked straight towards the Mönch for about half-an-hour, when we arrived at the edge of the narrow Eiger glacier, which descends from between the Eiger and Mönch, affording difficult access to the lofty pass at its head. A few minutes served to carry us across this dirty and (in this its lower portion) uninteresting tongue of ice, and to land us on the steep and shaly slopes which form the foot of the Mönch. We mounted these at a deliberate, not to say lazy, pace, influenced partly by the heat of the afternoon, and partly also by the consideration that, as our heavily laden porters could go no faster, we might spare ourselves the useless exertion of quickening our speed. The stony ascent, over which two of us had passed together in 1862 no less than five times within the same week, seemed friendly and familiar, and therefore surprisingly short, as is always the case with a known track in the Alps revisited after a long interval, unless it goes to the opposite extreme, and appears most unreasonably long. After about half-an-hour's steep but easy ascent we reached the edge of the Guggi glacier, at the only place where convenient access can be gained to its surface, and halted for a while to give the porters rest. This is just at the point where in the illustration the glacier seems to extend furthest to the left; and thence-forward our way lay entirely over the ice, until we reached the Schneehorn (the dark pyramidal mass on the right of the picture, standing out below the topmost ridge), on to whose rocks we eventually scrambled at a spot more than half-way up its left side.

While we sat and contemplated the view, the two guides

disappeared round a corner, and presently dragged into light no less than three ladders, which had been left there by previous parties. Selecting the stoutest of the three, they tied to it our young fir tree, which had hitherto remained unattached, and informed one of the porters that this must be henceforth his share of the baggage. His load was distributed among the remainder, and we assumed each the burden of his own little pack, which up to this time Christian had insisted on our not carrying. Thus equipped we set off up the glacier, which seemed more broken than in 1862, and was entirely bare of snow, as was not unnatural so late in the summer. After a short distance, when the incline began to grow steeper, we found the ladder extremely useful in helping us across deep chasms, which but for its aid we must have turned by a long circuit, while the necessity for cutting a few steps recurred with disagreeable frequency. However our party was not of unwieldy numbers, and we got on tolerably fast, considering the heat of the afternoon and our porters' loads; till after two hours of dodging among the crevasses, and working laboriously up frozen slopes, we reached the place where, according to all the laws of propriety, we ought to have found a wide plateau, forming a distinct break in the general line of the glacier's descent. Here we had sat for several hours in 1862, while explorations were made beyond, and G— had very naturally been expatiating to his companion on the incidents of that memorable *séance*, and was expecting to point out the spot. The form of the glacier however had so changed in the interval of three years, that the familiar features were entirely obliterated, and there was scarcely any plateau at all. We sat for five minutes' rest in perfect security just about the place where, on the former occasion, we had rushed past as speedily as possible, lest some spire of ice should topple over on our heads.

As if to make amends for the greater obstacles we had encountered

below, we found in the part above where the plateau ought to have been, very little of the difficulty or danger we had anticipated. The wilderness of broken crags and towers of ice, through which on the first passage we had hastened before half-past seven in the morning, fearing that the first touch of the sun might bring some of them about our ears, had apparently fallen to pieces, so that we made our way with no great trouble over and amongst the débris of this icy labyrinth. Above this region, which it took us about an hour and a half to pass through, is another level field—a second step, as it were, in the gigantic staircase which leads up the Guggi glacier to the Jungfrau Joch,—which though not actually visible from the lower elevation at which our picture was taken, betrays itself by a smooth appearance of the snow above the ice-fall, and almost directly below the little white pyramid on the sky-line which marks the pass. Across the whole width of this plateau extends an enormous crevasse, the characteristic difficulty and wonder of the Jungfrau Joch, which fairly separates the glacier into two portions, and renders the aid of a ladder indispensable. We found, much to our annoyance, that the only place where we could cross, even with the ladder, was at the extreme eastern end of the crevasse, as far as possible from our destination, the Schneehorn. There was no help for it, however, and we made the best of our way to the assailable point, and crossed the crevasse just as the friends we had left in Grindelwald were sitting down to their seven o'clock dinner.

At this exact time, as we were afterwards informed, our own immediate party were getting near Mürren; and two of them who had formed a pretty clear idea of the route we should take, but had never succeeded in catching sight of us among the intricacies of the glacier, stopped to look back at the Jungfrau Joch, and speculate on our probable progress. While scanning through

a glass the region of the great crevasse, they caught sight of a line of tiny black specks moving along its upper edge at a rapid pace, and speedily disappearing behind some inequality in the surface. Satisfied with this recognition, an unusually accurate one for a distance of nearly four miles, they went on to their comfortable little inn. assured that we were within easy reach of our resting-place, and happily as ignorant as we then were of the intervening difficulties.

At the end of August the sun has a deplorable habit of setting rather before than after seven o'clock, and we now saw that we should be fortunate if we reached our appointed resting-place before dark, though nothing but a level walk of no great length intervened between us and the rocks. Unfortunately we were now fairly above the snow-line, and as the sun had been shining all day with great power and unclouded brilliancy, the snow under foot was so soft that at every step we sank above the ankle. This impediment to rapid progress was tantalizing, as the daylight waned above us; but the distance was not great, and as we approached the rocks we could still see whither to direct our course, so as to strike them at an accessible point, and indulged in the hope of being snugly lodged in some convenient recess among the rocks before darkness fairly set in.

The snow, as is almost invariably the case, lay in a steep slope, as if piled against the rocks; but from the shape of the ground the slope rose not directly towards them, but obliquely, so that we had to cross the face of the slope to reach the spot where alone we could see convenient footing. To our horror we discovered that the last few yards were not snow, but ice, smooth and extremely hard, which had been formed by the constant trickling of water off the rocks above, soaking into the snow, and converting its surface into ice. In broad daylight it requires very nearly a minute to cut each step in ice of the consistency we here encountered, if any danger is to be apprehended

from a fall, such as to render it needful to guard carefully against the chance of any foot slipping out of the steps. The experienced reader may judge of the time we took to cross this miserable barrier, in darkness which grew total long before we were off the ice, without the smallest idea what would become of any one who should fall, and with heavily laden men, at the end of a fatiguing walk. Under the circumstances no one could possibly help our leader in his task, since he dared not stand to hew at the ice beyond, except in a step large enough for the weariest or least steady to follow in. For the first time in his life Christian turned round to G—, half-way across the slope, and asked for the brandy flask: he had been working hard all the way up the glacier, and this severe and unexpected exertion, coupled with the urgent need for haste, and a sense of the responsibility which rested on him as leader, reduced even his indomitable energy to seek an artificial stimulus.

The slowness of our progress, the sense of weariness and hunger, and the sight of the huge black pile looming up through the darkness over our heads, and apparently close to us, yet hopelessly, as it seemed, beyond our reach, made the whole passage impress us as a hideous nightmare; and we began to realize the feelings of those to whom the Alps are objects of terror, instead of sources of keen enjoyment. It must have been considerably past eight o'clock when we at length set foot on *terra firma*, and handing on the ladder to the front, took by escalade the lowest twenty feet or so of the rocks, which would have been awkward to climb unassisted. Scrambling up with such speed as was consistent with caution not to dislodge stones that might injure those behind, we presently found ourselves some 120 or 130 feet above the glacier, on a ledge sufficiently wide to sit upon, with a hollow near at hand in which a fire could be lighted. As we had not eaten since our midday dinner at the Wengern Alp, we were glad

enough to halt here, and adjourn the question of finding if possible a more comfortable resting-place for the night.

Leaving Baumann and the porters to raise a fire and unpack our stores, and the two *Herren* to amuse themselves by trying to find nooks where they could sit in peace without the necessity of attending to their equilibrium, Christian started off for a private exploring expedition up the rocks, and returned about the time supper was ready with the tidings that, though no sort of cave or shelter was discoverable, yet there was a somewhat broader shelf a little higher up. After a meal, washed down by some very grateful tea, we abandoned all our property except the blankets, and had another climb in the dark under Christian's guidance. The new accommodation was not exactly luxurious, but still was an improvement on our quarters below; and sharing the wrappings in an equitable manner, we settled ourselves for the night. G— sat down in a natural arm-chair of rock, not uncomfortable at first, but betraying itself after about half-an-hour, as rocks are apt to do, as the original pattern for the torture-chairs of the Inquisition; and then Y—, sitting in front, made G—'s knees serve him as a back to lean against. This was a very fair arrangement as regarded warmth, but had a cramping tendency for both parties; and presently Y—, declaring himself unable to sleep in a sitting posture, dissolved partnership, and found a nook for himself, where he managed to lie down till dawn.

The night was gloriously fine, and most exceptionally warm; for in general, as all mountaineers know by experience, the clearest nights are the coldest, from want of the clouds, which act as a blanket to keep the earth warm. There was no moon, but the stars were shining with a brilliancy not to be seen except by ascending 10,000 feet to look for it; and the sky-line of the Mönch and Jungfrau Joch could be traced in its minutest particular. All slept a little, being reason-

ably tired with the previous day's work, and in fairly good training; but no one seemed to think it at all an unseasonable idea, when Baumann, about three o'clock, mulled some wine *pro bono publico*. Time passed slowly away after this agreeable episode, diversified only by the leisurely consumption of breakfast, until by half-past four it was quite light enough to start. Porters are habitually slow in preparing for a move, and Almer, for some reason best known to himself, did not seem in haste to be gone, so that it was not until nearly five that we actually quitted our encampment.

A good warming scramble landed us at the top of the very steep but sufficiently easy rocks of the Schneehorn, several minutes ahead of all our followers except Christian; and we pushed on thence for a few minutes over snow, till we reached the summit of the little peak (somewhat behind, and to the right from the top of the black triangle of rocks conspicuous in the illustration), whence we could survey the level field that lay before us along the base of the Jungfrau precipice, accessible from where we stood by a short and very gradual descent. In fact the Schneehorn, though precipitous enough on other sides, is nothing more than the elevated corner of this great snow-field. By the time Baumann and the porters arrived we had convinced ourselves that the ladder would not be required to enable us to reach the Silber Lücke, or gap at the lowest point of the ridge joining the Jungfrau and Silberhorn; and the two men were therefore sent back from this point, the two guides and Ulrich Almer taking charge of everything necessary to be carried forward, not omitting the precious fir-tree. We heard afterwards that the return porters contrived to lose their way on the glacier, in spite of the little heaps of stones which Christian had erected for their guidance at every turn during our ascent, and reached the Wengern Alp late at night, by an exceedingly difficult and perfectly novel line of descent.

Roped together, we descended the gentle slope on to the crisp surface of the snow plateau and pushed rapidly across it, while the porters sat and contemplated our movements on the top of the Schneehorn. In about a quarter of an hour we had passed beyond the sham summit of the Jungfrau, which forms the apex of the huge precipice rising on our left as the boundary of the smooth field we were traversing, and reached the commencement of a short ascent, considerably crevassed, which would lead us to another plateau lying actually below the Silber Lücke, in the most sheltered nook between the Jungfrau and Silberhorn. As we plunged into this labyrinth we signalled a final farewell to the porters; and though in a very few minutes we began to wish that we had brought the ladder at least so far, yet Christian's unfailing skill found the requisite clue, and guided us successfully to the upper level. Completely sheltered as we were by the ridge of the Jungfrau and Silberhorn, we had up to this time believed the weather perfect, though the mists which filled the northern valleys, and shone with ominous red tints in the sunrise, did not seem to promise well for the afternoon. Now however as we approached near the Silber Lücke, we could hear the south-west wind roaring furiously through every gap in the rocky arête; and we began to reflect on the pleasant prospect of being fully exposed to its assaults during the long climb which we anticipated.

For some minutes we debated whether to make for the Silber Lücke, and thence turn upwards along the arête, or to climb directly up the face of the cliff above our heads, and strike the ridge at some distance up towards the summit of the Jungfrau. The latter course would keep us sheltered from the wind for some time longer, but there seemed every probability of our having many a weary step to cut in the thin sheets of what might be snow, but looked more like ice, which lay in frequent patches on the rocks above us. The former, if it were not

for the wind, was the more natural course to adopt, and, after some hesitation, was finally undertaken; and at 7·15 we stepped into the singular gap, like a doorway in a wall of loose stones, called very inappropriately the Silber Lücke, and were almost driven backwards by the fury of the gale.*

The ridge which runs up towards the Jungfrau is for some distance as narrow as a ridge well can be, and descends with extraordinary steepness on both sides, seeming scarcely thick enough to encounter such a wind as was now blowing, without being carried away bodily; but as it is composed of pretty solid rocks, the footing is good, and we should have made easy and rapid progress but for the gale. As it was, we were occasionally half choked by its violence, combined with the exertion of climbing, and had frequently to stop for an instant to recover breath. After an hour's work, however, we had passed along the narrow part of the ridge, and were able to diverge on to the slopes of snow, or rather névé, that line it on the right-hand side. The victory was practically won; for thence-forward we had merely to walk up these smooth swelling slopes to within a few yards of the summit of the Jungfrau, and—a matter more immediately conducive to our comfort—we no longer felt the wind so keenly as when we were exposed on the arête to its unbroken fury.

There is a singular charm about these rounded slopes, which lead in uninterrupted continuity up to the little plateau already referred to between the actual peak of the Jungfrau and the precipice overlooking the Wengern Alp. Like the level snow-field below, though of course

* Immediately below, and on the west side of the gap, was a rude wall of stones, enclosing a space about six feet square. This was the shelter constructed by MM. Aebi and Von Fellenberg, to protect them from a terrific storm which stopped them in an attempt to ascend the Jungfrau by this route; and there they spent the whole of a tempestuous night!

in a still greater degree, this region of smooth going and perfect security is only accessible by long and laborious climbing; and the suggested contrast gives it an especial interest, which in our case was enhanced by the remembrance of the fact, certain, yet at first sight almost unaccountable, that no human foot had ever trodden ground so easily traversed. Strange indeed it seemed that we should find so little difficulty in achieving an object always ardently desired and long believed utterly unattainable: in truth we were reaping a harvest which others had sown, and we felt proportionately grateful for our good fortune.

In about an hour and a quarter from the time of our quitting the arête, we had reached the undulating plateau above, and saw the final summit rising, a mere pile of rocks, directly in front of us. There was somewhat of a depression in the snow-field between us and the peak, and a few irregular crevasses, which obliged us to make a circuit to the left. Christian however, instead of taking the best course for the foot of the rocks, led us far away to the left, until G—, who happened to be next him, could not forbear enquiring whether he was so steering to avoid some obstacle hidden to less experienced eyes. "Herr," said Christian, turning round and stopping emphatically, "we must go up there first;" and he pointed to a little snow hill, shaped like a hog's back, at one corner of the snow-field. So utterly changed was the aspect of everything, that we had failed to recognize, in this trumpery mound, the peak which the world is taught on the Wengern Alp to reverence as the Jungfrau. On discovering the truth we acquiesced with the utmost satisfaction in Christian's proposal, and ascending the little hill, perhaps sixty feet above the plateau, gazed down the fearful precipice on to the earlier portion of our route, which had been for some time concealed from our sight by the ridge.

This, as a point never yet reached, was the destination of our fir-tree, which was there planted for an evidence of our success to the Wengern Alp and its neighbourhood, and was actually descried within a few minutes both thence and by our friends from Mürren. With no delay longer than was requisite for fixing our flagstaff firmly in the snow, we retraced our steps, and beguiled the time of crossing to the base of the Jungfrau rocks in discussing the propriety of naming our little peak. Since it is a conspicuous part of the Jungfrau in all distant views from the north, and entirely masks it from immediately below, there appeared good reason for giving it a separate name, and the most appropriate and intelligible seemed to be WENGERN JUNGFRAU, which title was accordingly conferred upon it, subject of course to an appeal from our judgment to a superior tribunal.

Cutting a few steps over the last piece of snow, hardened almost into ice by the water which had drained into it from above, we scrambled easily up the steep pile of rocks, and soon found ourselves on the usual track up the peak, within some ten feet of the summit. The gale seemed to have reserved its fiercest efforts until the moment when we should be most entirely at its mercy, and three or four times, as we walked along that narrow and exposed edge of snow which led us to the actual top, we were forced to crouch down and cling desperately to our axes. Fortunate indeed was it for us that the final ridge was not ice, as is frequently the case, or we should have found it almost impossible to make our way along it. At length however we reached the topmost pinnacle, and crouched down in the snow beside a bare pole which had been left as the trophy of some recent ascent.

It was only 10.15, much earlier than we had calculated on attaining our goal; but there was no temptation to stay long. Clouds lay along the whole southern horizon, showing that the wind was likely soon to bring its usual companions, rain and snow. Hunger too,

which began to be urgent, could hardly be appeased on a spot so exposed that we felt a momentary fear of being blown away, even as we sat. We scratched our names on the pole, and cut off an inch from its top, which caused some subsequent scepticism when exhibited as the actual summit of the Jungfrau, and then after a stay of only ten minutes, returned along the ridge to the point where we had struck it, and thence descended a little way on the southern slope to a near patch of rocks. Here we could enjoy our well-earned meal, and study the magnificent view in comparative comfort, though the latter operation, by bringing forcibly before our minds the threatening aspect of the weather, did not tend materially to raise our spirits.

The Jungfrau is usually ascended by a long and steep slope, rather narrow, but too much rounded to deserve the title of arête, running up from the Roththal Sattel, a marked gap or col, nearly south of the peak, and about 1,250 feet lower. This slope being fully exposed to the southern sun, the snow upon it is very rapidly compacted into ice, so that travellers generally have many steps to cut in ascending it. We could not see from our resting-place much of the slope, which appeared to curl over immediately below us, and uneasy anticipations of possibly finding three or four hours' hard work to go through made us eager to lose no time. About eleven we started downwards, and were fortunate enough to reach the Sattel in two hours, most of which time was expended in step-cutting, five hours being by no means an unheard-of time for the distance. Most heartily glad we were to reach at length a place where we could drop behind the ridge, and find shelter from the wind, a companion of which, after six hours' experience, we were sufficiently tired, besides being chilled by the process of standing for forty-five seconds or so on each foot alternately, while descending the ice-staircase.

Our destination being Grindelwald, and not the Æggischhorn, the

starting-point for ascents of the Jungfrau by the old way, we turned sharply to the left off the Roththal Sattel, quitting the route usually followed along the side of the Kranzberg, and struck directly downwards. Plunging down some slopes of snow, very steep and most uncomfortably soft, we soon landed on the level uppermost basin of the Great Aletsch glacier, and after a little rest started to cross the huge snow fields intervening between us and the Mönch Joch. The distance to be traversed was not less than three miles, as the crow flies; and there was a considerable descent and re-ascent to make, the snow throughout being well over our ancles; so that it cost us two hours and a quarter of tolerably laborious walking to reach the Mönch Joch. About half-way mists surrounded us, and we had to plod on in the dark, secure in the conviction that we could not go wrong, but losing all count of the distance. The fog cleared away sufficiently to show us the heap of planks at the southern foot of the Mönch, brought up by the Grindelwald guides for the construction of a hut, which we had reckoned upon to afford us precarious shelter for the night if things went wrong. Now, however, we had been so successful that we calculated with tolerable confidence on reaching Grindelwald; at any rate we could descend part of the way, and take refuge if necessary in the well-known cave under the Eiger near the base of the steep descent.

Clouds still enveloped us when, about four o'clock, we at length looked down from the Mönch Joch upon the basin of the Grindelwald glacier five thousand feet below; but the pass was familiar to the two guides, who had fortunately also traversed it very recently, and were aware that the steep snow slope, by which the passage had always hitherto been made, was now rendered impassable by crevasses, a change resulting probably from a diminution in the amount of snowfall during past winters. The snow was extremely soft, and it was

not therefore unpleasant to be compelled to diverge far to the right from the old line of descent, and make our way down a steep ridge of easy rocks. As we did so, a thunder-storm burst over our heads, and speedily soaked us to the skin. Since, however, the sky partially cleared after its cessation, our spirits rose as we gradually became dry; and when we finally reached the foot of the wall we pushed downwards across the glacier, without a thought of the Eiger cave. At 6.30 we once more set foot on *terra firma* under the eastern end of the Eiger, and as we were only an hour's rough walking off the Eismeer, the level basin of the Grindelwald glacier, across which we could walk in the dark if necessary, we halted for a few minutes to obtain some much-needed refreshment.

We had hardly started again when another thunder-storm began; we seemed to be almost in the cloud, which rendered it totally dark without any interval of twilight, and drenched us for the second time. With marvellous sagacity Christian contrived, by the aid of the lightning, to guide us in the direction of the faint track which has been worn through that wilderness of huge stones, slippery grass, and still more treacherous rhododendron and juniper scrub. Frequently we had to stop while Christian groped about for the path, if such it may be called, out of which we had strayed, but while in motion we went as fast as he could lead, slipping and tumbling about with a reckless disregard of every consideration except getting on. Never, perhaps, in our whole lives did we more heartily appreciate the value of an alpen-stock, and of practice in using it; hastening down a steep slope of the roughest ground, with no idea whether the black object dimly discerned through the darkness was a rock on which we could tread safely, a hole into which we should stumble, or a bunch of twigs off which the foot would infallibly slip, we could depend on nothing except the trusty ash poles, and indeed we walked more on them than on our legs.

After we had progressed in this very uncomfortable manner for nearly an hour, Christian called a halt under a large rock perched on the hill side, which gave us some scant protection from the rain, and imparted the pleasing tidings that further advance would in his opinion be dangerous. At the bottom of the slope, which is the eastern extremity of the Eiger, one reaches the Eismeer; and the way lies across this level plain of ice, to the good path by which excursions to the Eismeer are made from Grindelwald. But the slope ends abruptly in a precipice, down which there is only one way, and that only by footing precarious in broad daylight. Even could we discover the right point for commencing the descent, it would be madness to attempt it in total darkness, as slips would be inevitable, and serious injury, if not death, must result from a fall. There was no help for it, we must remain where we were until morning, and make the best of our extremely bad bargain.

After a few minutes' "squirming," to use an Americanism, under the rock, we saw the clouds lift and disclose the expanse of the Eismeer. Hope revived instantly, and we pressed on hastily downwards, for the chance of the moon breaking through the clouds, and so enabling us to complete the descent. The relief was but transient, for in three or four minutes it was darker than ever; and though we made one last effort, by expending all our matches in the attempt to light a fragment of candle, yet as both wick and matches were wet, perseverance was not rewarded. The rain now renewed its attentions with an ardour more impressive than flattering, and drove us with all speed into such holes as we could find. There were no large rocks at hand, but plenty of smaller ones; and, after effecting a partition of our few wraps, we burrowed, like so many black-beetles, each under his individual stone.

Strange as it may seem, the night did not pass in sleepless misery.

By covering ourselves entirely, head and all, we obtained a certain amount of warm air about us, sufficient to prevent our feeling the cold acutely, so long as the rain was not blown directly upon us. And, after the labours of the last two days, separated only by our almost sleepless night on the Schneehorn, we were all tired enough to sleep under even greater difficulties. Most welcome, however, was the appearance of daylight, to those who happened not to be dozing at the time, and the first shout assembled the party from their various dens. Our appearance was so woe-begone, that we might have furnished any enemy of mountaineering with a valuable text, had he only been there to see; but no one's spirits were much damaged, and our appetites were equal to the consumption of some damp meat and soaked bread. Without much delay we quitted our bivouac, and in about two hours were once more under the friendly roof of the Adler at Grindelwald, nor did any one of the party ever suffer the least ill effects from the wetting and exposure.

That the expedition here narrated is likely, or at any rate deserves, to become a favourite one, can scarcely be doubted. The pre-eminent beauty of the outline presented by the Jungfrau as seen from Berne or Interlaken has long rendered her the favourite both of Swiss and stranger. The neat franc and two-franc pieces of the Confederation bear a well-known figure of Helvetia, stretching out her arm over this the fairest of her summits, as if challenging Europe to shew its equal. The representation of the mountain is hardly of sufficient accuracy to supersede the necessity of a guide; but the main features of the ascent, the great central plateau, the Silberhorn, the arête which joins it to the "Wengern Jungfrau," and the retiring slope behind this arête which leads to the true summit, are indicated with considerable fidelity. The ascents hitherto made, whether from the Valais or from Grindelwald, have all been on the southern side of the

mountain; that is to say on the reverse side, if we regard the Swiss coin as shewing the obverse; and both for variety of interest and intrinsic beauty the northern access must be held far superior. The Schneehorn bivouac, it is true, would be intolerable in any but the most favourable weather; but there seems no reason why, now the upper portion of the route is known to be easy, a start should not be made from the Wengern Alp early enough to ensure a descent to the Faulberg, or at least to the Mönch Joch hut on the same day. It is quite possible that in July it may be found practicable to ascend and descend, by the new route, within the limits of daylight.

The tour of the mountain, as here described, has however one peculiar advantage, which makes the expedition as a whole superior to any other in the Oberland. It is a common complaint of climbers that there is a monotony about descending a mountain by the way you have ascended; here not a step of the way is repeated, and every variety of Alpine work is to be encountered in the course of the expedition. A night in a hut, or an actual bivouac in favourable weather, is not generally regarded as a hardship by mountaineers, and the second night out may easily be avoided. Our expedition was made very late in the season, and under the peculiar conditions which belong to a first exploration; and yet we should certainly have reached Grindelwald in time but for the thunder-storm, which robbed us of our last hour of daylight.

CHAPTER IV.

GLACIER PHENOMENA.

Thus Nature works as if to mock at Art,
And in defiance of her rival powers ;
By these fortuitous and random strokes
Performing such inimitable feats
As she with all her rules can never reach.—COWPER.

IN describing the formation and course of a glacier, we omitted, for the sake of clearness, all mention of the *moraines*, which greatly alter the external aspect of glaciers, though they have no important effect upon their formation. The term moraine is often used loosely to signify all stones and dirt strewn on the surface of a glacier, but it has properly a more limited meaning, which cannot better be explained than in the words of Professor Tyndall :*—

" The surface of the glacier does not long retain the shining whiteness of the snow from which it is derived. It is flanked by mountains which are washed by rain, dislocated by frost, riven by lightnings, traversed by avalanches, and swept by storms. The lighter débris is scattered by the winds far and wide over the glacier, sullying the purity of its surface. Loose shingle rattles at intervals down the sides of the mountains, and falls upon the ice where it touches the

* " Glaciers of the Alps," p. 263.

rocks. Large rocks are continually let loose, which come jumping from ledge to ledge, the cohesion of some being proof against the shocks which they experience; while others, when they hit the rocks, burst like bomb-shells, and shower their fragments upon the ice. Thus the glacier is incessantly loaded along its borders with the ruins of the mountains which limit it; as the glacier moves downward, it carries with it the load deposited upon it. Long ridges of débris thus flank the glacier, and these ridges are called *lateral moraines*. Where two tributary glaciers join to form a trunk-glacier, their adjacent lateral moraines are laid side by side at the place of confluence, thus constituting a ridge which runs along the middle of the trunk-glacier, and which is called a *medial moraine*. The rocks and débris carried down by the glacier are finally deposited at its lower extremity, forming there a *terminal moraine*."

Every medial moraine having once been lateral, until the junction of some new affluent made it medial, and supplied a new lateral moraine to the united glacier on the outer side of its own stream, there is obviously no difference in origin between the two kinds. There is however considerable dissimilarity in appearance, the medial moraines being prominent to all eyes, and the lateral ones being easily confounded with the solid ground of the valley side. The lateral moraines are also continually receiving increase from the source to which all alike owe their rise; débris of all sizes, from huge rocks down to the finest grit, are showered down from the bounding mountains on the edge of a glacier, covering it sometimes so thickly that few would discern the ice beneath, except at places where crevasses have cut through the mass. Conspicuous instances of lateral moraines are not easily given in photographs, since they tend to confuse themselves with the hill-side up to which they slope; but a little study of the picture at p. 78, will disclose a large one on the

left bank of the Unter Grindelwald glacier, and there is also one visible in the first illustration to Chap. VIII., on the left bank of the Ober Aletsch glacier.

Medial moraines on the contrary are extremely conspicuous in every comprehensive view of a glacier possessing them; they form long and strongly marked lines down its length, making the surface of a straight glacier look like a strip of music-paper. Such moraines are well seen in the two pictures last mentioned, and less conspicuously in the illustration opposite p. 109, where the starting of a medial, by the junction of two lateral moraines, is also shewn. It is very rarely indeed that a large glacier is found possessing no medial moraines, that is to say descending from one single source, and not formed by the aggregation of two ice-streams; the Rhone glacier, however, as may be seen at p. 23, is a noted exception.

The size of the medial moraines will of course depend on the nature of the mountains which bound the branch glaciers to which they were originally lateral. If the inclination of the mountains is not very great, and their sides are in consequence thickly covered with snow, comparatively little débris will be discharged from them; but if they are steep and rocky, a considerable amount of disintegration will necessarily take place, and give rise to large accumulations of moraine. So also the geological structure of the rocks, by determining the amount to which they will yield to the influence of the weather, is of great importance to the size of the moraine. If the amount of rocks and stones forming a medial moraine be large, it rises in a ridge above the level of the surrounding ice. Most of the long black lines which seem from a distance to be mere discolourations of the surface of a glacier, are really huge ridges many feet high. At first sight these seem to be simply the accumulation of débris, but on more careful inspection it is seen that the whole mass is ice, superficially covered

MEDIAL MORAINE ON THE OBER ALETSCH GLACIER.

To face page 57.

by the stones. The reason is, that the moraine protects the ice beneath it from the direct influence of the sun and air, which waste away the surface on each side. The stones are of course themselves warmed at the same time, and transmit the heat to the ice below; but if the stones are large, the amount thus conducted is much less than the quantity of heat working on the undefended ice. Moreover the heat which is conducted through the moraine, being necessarily obscure,* is prevented, by a remarkable and well-established property of ice, from penetrating into its substance. Thus the moraine is gradually raised above the surrounding level, and it will generally be found that the height of the ridge increases as it descends the glacier. In the accompanying picture is given a good near view of a moraine of no great dimensions on the Ober Aletsch glacier, beyond which, at a distance of more than two miles and a half, rises the ridge of the Beichgrat.

Medial moraines are often found to disappear, engulfed in the ice, where the glacier is much rent by crevasses; and they will at times again emerge from their imprisonment below an ice-fall, and once more form continuous ridges down the glacier. How much of this re-appearance is due to the wasting of the ice down to the level to which the moraine was swallowed up, and how much to the stones being really squeezed out again by the pressure, it is of course impossible to determine.

The rate of motion of a glacier has a tendency to diminish as it approaches its termination, and when this is the case, the moraine matter, instead of continuing to move in comparatively narrow

* *Obscure* heat is heat proceeding from a non-luminous source, such as a lump of metal not red-hot.

ridges, is more and more spread abroad over the surface of the glacier, until it in some instances, such as the Unteraar, covers the whole end of the glacier so completely, that it becomes hard to discover from a small distance what the dark and confused mass of stones and rubbish really is. This is properly called a terminal moraine, since the strict signification of the term moraine is stones and dirt carried on the ice of a glacier; but the name is more frequently applied to the curved line of stones deposited by a glacier at its termination, and lying free of the ice.

Most glaciers of the Alps have at some period been more extensive than at present, and have left traces of their former selves in the shape both of lateral moraines along the mountain sides parallel to the existing ones, and of terminal moraines forming a succession of concentric arcs similar in shape to the end of the glacier. By these old moraines, as well as by other indications, much is disclosed of the ancient condition of the ice-streams; indeed we may sometimes find the same thing happening under our eyes. The Rhone glacier is known to have shrunk steadily for many years, and the evidence of it is sufficiently visible, though from the unusual clearness of the glacier not very conspicuously. Six or seven old terminal moraines can be traced in front of the present termination of the Rhone glacier, through which the stream has cut its way. One of these is very clearly seen in the illustration at p. 23, and one or two more may be discovered in it by careful inspection.

The same causes which elevate the medial moraines in long ridges above the level of the ice operate also to produce other glacier phenomena, exhibiting on a smaller scale, but in a manner still more unmistakeable, the working of the natural laws already mentioned. The objects most closely analogous to moraines are what are termed *dirt-cones*, of one of which, noticed on the Unter Grindelwald glacier,

a picture is given below. From the surface of the ice there rises what appears to be a conical heap of sand or dirt, but is in reality a mound of ice, coated more or less thickly with dirt. In the illustration a patch of the ice is visible, where the sandy covering had, by

A DIRT CONE.

some accidental blow, been cleared away; this cone is about four feet high, but they may be found of all sizes, from a few inches up to eight or nine feet, and of shapes somewhat divergent from the typical form.

High up "among the hidden bases of the hills," a quantity of

gritty fragments are dislodged from some rocky slope, and fall in a heap on the glacier. It may happen that they are speedily dispersed by the wind, and spread widely over the surface, contributing their mite towards toning down the shining whiteness of the upper névé into the blackish hue the glacier assumes in lower regions. Sometimes however such a patch of dirt falls on a sheltered spot, or is covered by snow before the wind has had time to dissipate it; then it travels downwards unmolested, and emerges at length in the open region below the snow-line. Should an ice-fall occur in the course of the glacier, our dirt-heap will have but a very faint chance of passing down it undisturbed; in all probability it will be entirely dispersed or swallowed up in the ice. Hence it is that dirt-cones are seldom found except on glaciers whose flow is smooth and equable; there are probably more on the Aar glacier alone than in the whole range of Mont Blanc.

Supposing however that our patch of grit has braved all the dangers which beset its path, and has safely landed on a tolerably smooth and level reach of the open glacier, it soon becomes elevated above the surface of the surrounding ice. The sun's heat falls with equal potency on the whole; but while the general surface is melted, the ice under the dirt-heap is protected, and remains intact. If the dirt happens to cover the area of a tolerably symmetrical circle, thickest near the centre, a perfect cone will be formed, since the layer thinnest round the outside will only serve to protect the ice partially, while the centre will protect it entirely, and will gradually be raised until the grit is spread uniformly over the whole surface of the cone. It has then done its work; the ice must begin to melt, and the water trickling off it will gradually wash away the dirt, and thus accelerate the process of melting.

Whatever be the shape of the patch of dirt when the formation of

the cone begins, the thickest layer will necessarily rise highest, or more accurately will retain its height while the surface melts around it, and the thinner parts will slope gradually to it in proportion to their thickness. Thus where heaps of grit happen to have fallen in close proximity to each other, miniature chains of hills will be created out of them, varying infinitely in form like their mighty rivals, but all tending more or less towards the conical type. Dirt-cones will of course usually be found in close proximity to a moraine, since they have a common source in the débris falling from the mountain sides; and in fact a moraine, when it rises, as it usually does, in a ridge above the level of the ice, is merely a dirt-cone on a very large scale and extended to a great length instead of being isolated. Occasionally also the layer of dirt which forms the nucleus of a dirt-cone, is washed by the rain off an existing moraine down to the ice beside it; and probably most of the cones found on glaciers below a steep fall are originated in this manner.

It will be found on investigation that the ice under the moraines and dirt-cones, when a portion of it is uncovered, appears clear and almost black, like a mass of very dark glass, while the surface of the glacier in their immediate vicinity is white and opaque. The reason for this difference may be easily stated; the unprotected ice is disintegrated by the rays of the sun, and its interstices being filled with air and water, it thence derives a white hue. The ice under the moraines, on the contrary, is protected from the direct influence of the sun, and therefore remains thoroughly compact and transparent; while the coating of stones and dirt prevents any light from shining into the mass from other quarters than the one spot uncovered by the observer.

The same general principle may be discerned in the formation of *glacier-tables*, which are blocks of stone raised on pedestals of ice.

A fragment of rock falls on the glacier apart from its congeners, which form a moraine in the usual way. If it fall on the open glacier the growth of a glacier-table begins immediately; if it fall in the region of everlasting snow the process is deferred until in course of time it reaches the lower elevation, where the sun can act freely on the glacier. The stone protects the ice immediately under it, while the surrounding surface is wasted away; and thus gradually it is left on the top of a column of ice, as in the annexed illustration. This table was found on the Aar glacier, a locality specially favourable to

A GLACIER TABLE.

their formation, since the coarse granite, which constitutes a large proportion of the mountains whence the branches of the Aar glacier take their rise, seems to cleave very frequently into slabs, such as fully carry out the idea of a table when elevated on their icy pedestals. The figure beside it in the picture, which is that of a man of average stature, will give a sufficient idea of the dimensions of this table; but it is not a third of the size of one discovered on the previous day, which unfortunately slipped off its pedestal before we could photograph it.

If the sun's rays fell vertically upon the slab of stone, there would be scarcely any limit to the height to which it might be raised; the pedestal would be exposed only to the wasting influence of the air around it, when warmer than the freezing-point, and would but very slowly indeed become too frail to support the superincumbent weight. But since the sun's rays fall obliquely on the table, two effects are produced, which both tend to the same result. The southern side of the block of stone receives more heat than the northern, and consequently transmits more to the ice beneath; and further, as soon as the stone is raised some little height above the surrounding surface, it ceases entirely to shade the southern side of the pedestal. Hence the stone gradually dips more and more towards the south, and finally slips off its pedestal, which being no longer protected speedily disappears, while the formation of another table begins under the stone.

The production of all the glacier phenomena which we have been hitherto considering depends on the condition that the sun's heat should not be able to penetrate the layer of stone or dirt which covers the ice. Supposing however that the stone be a small one, or the dirt thinly scattered, a result follows which is precisely the converse of those before described. Stones or grit, especially if they be dark

in colour, absorb the heat with much greater rapidity than ice, so that if they are small enough to conduct the heat to their under-surface more quickly than the heat penetrates the exposed ice, they will gradually sink into the ice. A certain size of stone of course will neither sink in nor be raised above the surface as a table, but will remain on the same level with the ice around it; and thus it is that we sometimes find thin lines of moraine distinctly visible in a glacier, yet not forming an elevated ridge. Several such moraines may be observed in the illustration to Chapter IX., lying along the unusually smooth and level surface of the Ober Aletsch glacier.

The holes formed by stones or thin patches of dirt, sinking into the glacier, will often grow to a depth of many feet, and are always filled with water, which appears of a lovely blue colour, due of course to the ice in which it is contained and not to itself. The water in these holes is the purest and coldest imaginable, and is very fully appreciated by the mountaineer, when he reaches the lower level after a day spent in climbing among the heights.

Many of the water-holes found on a glacier are however formed in a totally different manner, and only become filled with water after having served another purpose. Mention has frequently been made already of the melting of the ice on the surface of a glacier by the direct influence of the sun, and the question will very probably have occurred to the reader, as to what becomes of the water thus formed. While the mass is still névé, and has not yet been consolidated into glacier, we have seen that the water sinks through the upper layers, and aids in solidifying the lower ones. When however the substance of the glacier has become tolerably hard ice, water will no longer penetrate downwards, but runs over the surface in whatever direction it can most readily make its escape. Thus channels are formed in the surface of the glacier, along which run streams of water, growing in

volume as they descend, and widening and deepening their bed, like rivers of a larger growth. A picture of a glacier rivulet will be found in the concluding chapter, where the subject of the carving of the surface of glaciers by this means is again referred to.

It is obvious that if the glacier be much broken by crevasses, there will be no space for the formation of superficial streams of any magnitude. It will frequently happen, however, that, even where the flow of the glacier is equable and its surface continuous, small local strains, such as a protuberance in the bank of the glacier, or some slight inequality in its bed, will produce cracks which penetrate very deeply, though there is nothing to make them widen into large crevasses. Imagine such a crack intersecting the course of a surface stream; some of the water will rush down it, and gradually wear away the ice, until soon a funnel is formed large enough to receive the whole volume of water, which pours into it in a cataract. These funnels are called *moulins*, and they are to be found wherever there is an unbroken surface of glacier. The instance, photographed on the next page, is taken from the Unter Grindelwald glacier, and is of about the average size, the diameter of the funnel being rather more than a yard.

The edges of a moulin are speedily wasted by the sun and air, so as to form a somewhat bell-shaped mouth to the hole, which makes it occasionally difficult to look down; and the rush of the falling water renders every effort accurately to measure the depth unavailing. There is little doubt that some moulins penetrate the whole thickness of the glacier, and that the waters descending them form no inconsiderable part of the stream which issues from under every glacier; others, and probably the majority, do not reach the bottom, the water finding its way into some opening in the heart of the ice, and tunnelling onwards for some little distance until it meets with another vertical

shaft. A singular instance of water returning to the surface after a sub-glacial course is described in Chapter VII.

AN ACTIVE MOULIN.

It was once supposed that the moulins did not move with the mass of the glacier, but Professor Tyndall has clearly proved that they

move in precisely the same manner as the ice around them. This erroneous impression originated in the undoubted fact that they are constantly found in the same locality, but the explanation is easily given. The formation of moulins is due, as we have already seen, to the breaking of the ice, where it is generally continuous, under the influence of some local strain: and as the shaft moves downwards, the channel of the stream flowing into it moves also. "But as the motion continues other portions of the glacier come into the same state of strain as that which produced the first crack; a second one is formed across the stream, the old shaft is forsaken and a new one is hollowed out, in which for a season the cataract plays the thunderer. I have in some cases counted the forsaken shafts of six old moulins in advance of an active one."*

The extinct moulin, of which a picture is given on page 68, was found on the Unter Grindelwald glacier in the immediate neighbourhood of the active one pourtrayed above, though the two were not created by the same stream. The moulin now doing the work of the forsaken one shown below was not a hundred yards distant from it, the glacier between the two unbroken by crevasses and very gently inclined, and the deserted channel of the stream clearly marked—thus exemplifying in every particular the theory above stated. The old shaft, which necessarily communicated more or less directly with the bed of the glacier, had had no time to be squeezed out of shape, or to have its sub-glacial adits choked up. In a few more years this will probably have happened, and the hole will be full of water; in a few more it will reach the brow of the steep descent out of the Eismeer, a crevasse will rend it asunder, and subsequently the pressure which

* Tyndall's "Glaciers of the Alps," p. 364.

results from another change of inclination will obliterate all trace of it.

In addition to the large and important glaciers, each filling the

AN EXTINCT MOULIN.

bottom of some valley, with which we have been hitherto concerned, the mountain snows form innumerable small patches on the steeper

and more elevated slopes, which are termed *secondary* glaciers. These occur at frequent intervals along the mountains, on each side of most glacier valleys; some of them descend far enough to unite their tributary stream to the main ice-river, some terminate abruptly above it. Instances of them may be observed in the illustration at page 109, on both sides of the valley leading up to the Lauteraar Joch, and also in the view from the Sparrenhorn given in Chapter VIII. Many of these secondary glaciers are, as will be noticed, unconfined by any bounding walls, but spread loosely over the mountain side. From their very nature and position it is almost impossible to make any measurements or careful observations of them, but it is reasonably conjectured that their substance, from want of any severe pressure, is less compact than on larger glaciers, and that their motion is comparatively slow. Professor Forbes measured the motion of one of these secondary glaciers, situated near the hospice on the Simplon, and found it to be very small, less than two inches a day ; but this is the only published evidence on the subject.

It often happens that one of these minor glaciers terminates at the brow of a steep cliff, and thus gives rise to a phenomenon which illustrates most remarkably the power of pressure in the formation of glaciers generally. The end of the ice, being pushed over the edge of the precipice, is broken off by its own weight : and there being nothing in front to retard its descent as in the case of an ordinary ice-fall, it is precipitated to the base of the cliff, and broken to fragments in its fall. The débris however speedily reunites itself, by the melting influence of the sun and the violent pressure exerted on the mass by the fall of each icy avalanche ; and,

> As a stream that spouting from a cliff
> Fails in mid-air, but gathering at the base
> Re-makes itself, and flashes down the vale,

A GLACIER REMANIÉ

a tiny glacier is formed, which soon merges its identity in the main glacier to which it unites itself. An instance of a *glacier remanié*, as the Swiss savans have termed the re-formed secondary glaciers, is given in the accompanying picture, which was taken on the Aar glacier. On this small scale they are sufficiently numerous, but they may occasionally be found of a much greater size. Many travellers will be familiar with the Schwarzwald glacier, which is formed close

to the Scheideck by débris falling from the Wetterhorn, and the Kühe glacier, at the foot of the northern precipice of the Jungfrau, which likewise originates in this manner. The latter is in fact produced by those avalanches which form so sublime a spectacle from the Wengern Alp, and both the glacier itself and the avalanches have been vividly described in the first volume of the Alpine Journal by Mr. Francis Galton.

Pervading a great part of almost every glacier, though by no means everywhere visible, is an appearance which has attracted great attention and caused considerable controversy among the students of glacier theory, commonly known by the name of *blue veins*, or the *veined structure*. So many minute but interesting phenomena arise wholly or in part out of this veined structure, and so important is it in disclosing the previous history, so to speak, of the ice in which it is developed, that mention of it cannot be omitted here, although the inability of the photographic art to give effect to blue colour renders it impossible to show more than slight indications of it in the illustrations.

The general appearance of the veined structure has been thus described: *—"The ice of glaciers, especially midway between their mountain sources and their inferior extremities, is of a whitish hue, caused by the number of small air-bubbles which it contains, and which no doubt constitute the residue of the air originally entrapped in the interstices of the snow from which it has been derived. Through the general whitish mass, at some places, innumerable parallel veins of clearer ice are drawn, which usually present a beautiful blue colour, and give the ice a laminated appearance. The

* Tyndall's "Glaciers of the Alps," p. 376.

cause of the blueness is that the air-bubbles, distributed so plentifully through the general mass, do not exist in the veins, or only in comparatively small numbers."

This beautiful appearance may be seen on the walls of many crevasses, where the ice has not yet become disintegrated through exposure, in the deep channels cut by some surface streams, or in the sides of water-holes—anywhere in fact where the genuine substance of the glacier is exposed to view. The lines or rather plates of blue ice are in general vertical, or nearly so, and inclined at a great variety of angles to the direction in which the glacier is moving. They are found stretching across the whole width of a glacier in continuous curves, having been originally formed in straight lines perpendicular to the axis, and gradually altered by the more rapid motion of the centre into curves whose vertex points down the glacier. They are found parallel to the line of motion of the glacier, or at right angles to the direction last mentioned, and also, near the edge of a glacier, inclined downwards in a direction perpendicular to that of the marginal crevasses.

The first person to attach any great significance to the veined structure was Forbes, although many observers before him had noticed the phenomenon. He traced its presence in glaciers generally, showing that it was not a mere exceptional appearance, but an essential part of the structure, which must necessarily be accounted for by any theory professing to explain fully the motion of glaciers. Previous observers had attributed the blue veins to the stratification of the snows which constitute the névé, and there is some difficulty in giving absolute proof that this cannot be the case, since lines of undoubted stratification may be traced in the upper regions of the névé. Tyndall and others, however, have succeeded in finding instances of vertical blue veins crossing these lines of bedding,

showing that in some instances at least they are the result of distinct causes; moreover the veined structure is most frequently vertical, while the stratification is necessarily horizontal, and it is scarcely possible to imagine that the whole mass of a glacier should have its strata turned on end, even in passing through the longest and most complicated of ice-falls.

Having satisfied himself that the veined appearance is not the result of stratification, Professor Forbes offered an explanation of the blue veins, consistent with his general theory that a glacier is a viscous or semi-fluid body. He referred them to "the bruising and rending of the parts," produced by the moving of one particle of the semi-fluid mass past another in obedience to the law of gravity, and to the subsequent re-attachment of the surfaces, either by water filling the fissures and then freezing, or by simple cohesion.

Just as Forbes felt that the blue veins must be explained in harmony with his general theory, and was partly led by observing this phenomenon to the formation of his theory, so Tyndall made the veined structure an important subject of his investigations, and his pressure theory of glacier motion is strongly supported by the conclusions which he draws from the observed facts of the veined structure. Forbes was hovering near a true solution of the problem, when in his first Letter on Glaciers he spoke of the strong similarity in appearance between the veins in ice and slaty cleavage; and Tyndall, starting in his researches into glacier theory from the phenomena of cleavage, has shown that the blue veins are in truth the equivalents in ice for the cleavage exhibited in slate and other crystalline rocks.

Intense pressure operates, as is well known, to develope in these rocks and in many other substances flat surfaces, technically known as *planes of cleavage*, perpendicular to the direction of the pressure, and totally independent of the strata, if any, in which the rocks were

formed. Why this is the case, why the whole substance is not uniformly squeezed, leaving the relation of its particles unaltered, is a question beyond the scope of our present enquiries. The effect seems to depend partly on the difficult laws of crystallization, and partly on the fact that the pressure being in a given direction, the mass is thereby squeezed and flattened out in the opposite direction.

The blue veins however are not planes of cleavage, that is to say surfaces where the mass will split readily, where the particles are less firmly coherent; on the contrary they are, as has been stated, the most solid portions of the ice. Why then does the pressure which, acting on crystalline rocks, produces a given result, have an opposite effect when applied to ice, which is crystallized water? The explanation is to be found in that which makes the whole problem of glaciers capable of solution, namely regelation. By means of this property the particles of ice, on being subjected to the intense pressure which not only squeezes them more closely together but forces them into new relative positions, freeze together more firmly than ever; and so the force which but for regelation would produce cleavage, is converted by its potent control into an instrument for solidifying the glacier.

It has been established by Professor James Thomson that the temperature at which ice melts is lowered by pressure; that is to say, ice at the freezing-point, if subjected to great pressure, will begin to melt. The amount* of compression required to produce any sensible lowering of the melting-point is very considerable; but since the

* The proportion of pressure to change of temperature is usually stated as follows: the melting-point is lowered, ·0075° Centigrade for every atmosphere of pressure—or, to state it in a more familiar manner, the weight of a column of water about 33 feet high will lower the melting point of ice by about $\frac{1}{74}$th of a degree of the ordinary thermometer.

mass of a glacier is, so far as can be ascertained, uniformly at or near the freezing-point, it is more than probable that this property has an important effect in producing the veined structure, by inducing an extra amount, so to speak, of liquefaction, the water thence formed serving as the cement which renders the reunion of the particles in the blue veins so perfect.

The veined structure then being developed by special pressure in a direction perpendicular to the line in which the force acts, it is easy to trace the several kinds of pressure which produce the different kinds of blue veins already referred to. Those transverse to the axis of the glacier are formed at the foot of an ice-fall, where, as explained in Chapter II., the ice is very severely compressed on reaching the more gentle incline. Those parallel to the axis are caused by the mutual pressure of two ice-streams which unite to form one common glacier; and there is no better place for observing the veined structure in its greatest beauty and most perfect development than under a medial moraine. The veins which are found intersecting the ice at right angles to the marginal crevasses, and inclined therefore down the glacier, are explained by the mechanical fact, which Mr. Hopkins has demonstrated, that the strain caused by the more rapid motion of the centre, which produces the marginal crevasses, is necessarily accompanied by a thrust or pressure against the bank, in the exact direction required for developing the blue veins.

There being a great difference in solidity between the ice of the veins and that of the interstices between them, the laminated ice melts unequally, when exposed to the sun and air. The blue plates resist their influence somewhat longer than the rest, and thus little grooves and ridges are formed on the surface of the glaciers. Into these grooves the light grit and dust is blown by the winds, and washed

by rain and surface streams, thus forming fine lines upon the glacier, which afford a valuable guide in tracing the direction of the veined structure, with a view to discovering its immediate origin. More practically to our purpose is the fact that these lines are not only visible on the surface, without descending into a crevasse, but are also capable of being represented photographically. The picture already given at p. 25, which represents the waved appearance of the Aar glacier, also shows very distinctly the fine lines inlaid with grit which indicate the presence of the veined structure below. These are parallel to the direction of the glacier, and were caused no doubt by the mutual pressure of the ice-streams which unite under the shadow of the Finsteraarhorn. A similar instance on the Ober Aletsch glacier will be found in Chapter X., where also the direction of the blue veins is longitudinal; the little peak of ice, formed by the fantastic sculpturing of sun and wind, shows very clearly the lines of the veined structure, and allows it to be seen that they are not mere superficial lines, but plates penetrating the entire mass.

CHAPTER V.

THE EISMEER.

> The firths of ice,
> That huddling slant in furrow-cloven falls
> To roll the torrent out of dusky doors.—TENNYSON.

THERE are not a few persons who prefer the Unter Grindelwald glacier, with its various accessories, to any other in the Alps; and it will generally be allowed that it has no superiors in the way of combining varied beauties with instruction in nearly all branches of glacier theory. The path by which the upper basin, called the Eismeer, is reached from Grindelwald, is now good and easy until within a few minutes of the point where tourists can descend on the ice, and before the season of 1866 commences the upper portion of the path also will have been rendered available for horses. The distance is less than that to the Mer de Glace of Chamouni, and the walk in itself more interesting; and though the lake of ice presented to the view on reaching the corner of the Eismeer has not so vast an expanse as the great glacier river most inappropriately termed the Mer de Glace, yet the surrounding scenery is

grander and infinitely more varied. There is scarcely a mountain wall in the whole range of the Alps which can be compared to the Viescherhörner, as they are seen from the level of the Eismeer, or (as in the accompanying picture) from the path beside it. The ice-fall descending from under them, though not of gigantic size, is rendered specially interesting by the mass of dark rock which cleaves it in twain, like the island in the midst of Niagara. This rock is called the *Heisse Platte* (Hot Plate), from an idea that it is naturally so warm that snow will not rest upon it; and down its steep incline great masses of sérac, pushed over by the pressure from above, are frequently precipitated in avalanches of white fragments. Advance a little way on to the level field of glacier, and another wonderfully broken ice-fall comes into sight, that from the region of the Strahleck; while above it rises the grim tower-like form of the Schreckhorn, more impressive perhaps when seen on this its accessible side, though scarcely so beautiful in outline as from other directions, whence it is vain to dream of scaling its summit.

The Eismeer is singularly rich in all those varieties of aspect which a glacier can assume. Divided down the middle by the huge moraine composed by the union of the lateral moraines borne down by the two great branches of the glacier, it seems to be not one glacier, but two. The line of union, as it really is, appears to constitute a barrier of separation between two ice-streams totally different in their character. The tributary from under the Viescherhörner is, as may be seen in the illustration, so closely and uniformly pressed on reaching the bottom of its fall that it becomes nearly smooth, and regular in its flow, the side nearest the bank being somewhat more elevated but equally level. The Strahleck branch on the contrary is broken by every variety of crevasse: it never seems to recover its equanimity after the rude torture of the ice-fall, and the shape of the valley, which is curved into

THE VIESCHERHÖRNER, FROM THE EISMEER PATH.

To face page 78.

a vast bay between the foot of the ice-fall and the corner just below the Eismeer, exaggerates the confusion, or rather prevents it from being calmed down.

The ground beneath is too nearly level for the ice to be cleft into isolated masses, such as properly deserve the appellation séracs; the fissures are all more or less transverse to the flow of the glacier, and split the ice into thin slab-like masses, so smooth in surface as to suggest the idea of natural cleavage, like that of slate. It might indeed be fancied at first sight that the intense pressure exercised on the glacier in passing down the fall, which is extremely narrow as well as steep, has developed in the ice an actual cleavage, just as pressure has been shown * to produce cleavage in a great variety of substances, slate included. This however cannot possibly be the case, and that for several reasons. The direction in which the ice seems to split is not precisely identical in all cases, as it ought to be if the appearance of splitting were really due to cleavage. The blue veins already described are seen in great beauty and frequency, running vertically down these smooth walls of ice, thereby showing, if the explanation of the blue veins given in the previous chapter be accepted, that the intense pressure which might have caused cleavage in another substance was exerted in a totally different direction. Regelation, as we have already seen, renders all cleavage in ordinary glacier ice impossible; and though it is conceivable that such a structure might be developed in ice very much below the freezing point, yet there is no sufficient ground for inferring that this has been the case here. This portion of the Unter Grindelwald glacier is however well worth careful exploration; there are few ice-fields in the Alps where the veined structure is better exhibited, or where the

* See Tyndall's "Glaciers of the Alps," p. 427.

mountaineer can find more excitement, unmixed with actual danger, in threading his way through the labyrinthine crevasses.

On this, the right or Strahleck side of the central moraine, the ice is too much broken to admit of the formation of moulins, dirt-cones, or other glacier curiosities, except close beside the great ridge itself, where a very large rivulet flows over the surface of the ice, and plunges headlong into a moulin, successor to the extinct shaft figured on p. 68. As soon however as we cross the moraine, which rises at least a hundred feet above the smooth plain of ice on its left side, we find ourselves in a land of streams, one of which acts with great effect the part of moat at the foot of the rough wall of the moraine. Glacier tables are few and far between, a deficiency attributable in the main to the nature of the rocks forming the surrounding mountains, which usually are broken by their fall into comparatively small fragments, far inferior for table purposes to the huge granite slabs which deck the Aar glacier. Moulins however are in abundance, and blue mirror-like pools of water, and along the border of the moraine a profusion of dirt-cones. The general expanse of the ice is unusually free from impurity, and therefore affords an excellent opportunity for observing the disintegrating effects of the sun's heat. There is however one drawback to the enjoyment of a walk on this portion of the glacier, resulting from this very purity: the surface in consequence of its disintegration is intensely white, and compels everyone who has a regard for his eyes to resort to a veil or coloured spectacles.

The Eismeer, being the first stage of the journey towards the Strahleck and Mönch Joch, and the virtual terminus of the path from Grindelwald (for the faint track along the hill side under the Mettenberg is fit only for mountaineers), is well known to all classes of travellers; and the enterprising natives who reside at the chalet

built where the path terminates must make a very good thing of their speculation, both in the way of payment for refreshments and for guiding people about on the ice, and in the way of contributions towards the maintenance of the road. Claims of the latter kind are usually a mere imposition, and ought never to be admitted without enquiry into the circumstances of the case: but the application made at the Eismeer is a fairly reasonable one, since the rapid wasting away of the glacier, which has lowered its surface at least a hundred feet in the last four years, has necessitated the extension of the path, and the construction of ladders and an inclined plane to give access to the ice, the cost of which has been defrayed by the inhabitants of the chalet.

This diminution in the bulk of the glacier seems to have had considerable effect on its form lower down, and to have rendered it for the first time within living memory not difficult to cross it below the first fall out of the Eismeer; at least the people of Grindelwald did not know that such a thing was possible, and were much interested in the report of our first walk in that quarter, whereas it is improbable that a portion of the glacier possessing singular beauties, across which we found no difficulty in conducting ladies, should have so long remained unvisited, if it has always been equally accessible. The only point where it is easy to enter on the ice is a little way above the final fall of the glacier depicted on p. 87, and at some distance below the foot of the first fall. Between these two principal descents is a long space comparatively level, but displaying several minor changes of inclination. The channel being narrow, the glacier suffers considerable lateral compression, and hence the sides are even more fissured than must be the natural consequence of the marginal crevasses, while there is a comparatively smooth surface down the middle, on which the moraines may be traced without difficulty.

Our explorations of the Unter Grindelwald glacier had been carried on in a desultory manner, though as perseveringly as Jupiter Pluvius would permit, for several days before he, or his prime minister the clerk of the weather, would allow his fellow deity Apollo a chance of earning distinction with the camera. One gentleman of an enterprising turn had cut his way down from the Eismeer to the lower level of the glacier, an undertaking which must always involve considerable labour, or some danger in turning the chief difficulties of the ice-fall by crossing a bed of avalanche débris close under the Eiger cliffs. He in fact may lay claim to the honour of having opened this lower portion of the glacier to tourists, since his description of the remarkable things to be found there incited us all to further investigations in the same direction. Another of the party had induced a band of volunteers to go and search for blue veins towards the foot of the Strahleck ice-fall, and succeeded in getting himself and followers soaked by a succession of thunderstorms, a misfortune for which all found ample compensation in the grand music of the thunder, re-echoed from mountain to mountain round the vast basin of the Eismeer.

On the glorious Sunday which preceded the Jungfrau expedition, several of us started for an afternoon walk, with no intention of doing more than peer about the foot of the glacier; but having once entered on the ice, we scrambled on and on until we had crossed above the terminal cave and were close to the left bank. Here Christian Almer, whose propensity for active employment had led him to beg that we would accept his company, suggested the bright idea that we should ascend the left bank a little way, and see where the best ice-needles were to be found. Accordingly we mounted a very steep slope of ancient moraine, and soon reached the pleasant shade of the pines which clothe the whole mountain side, descending very nearly to the

glacier. Strolling leisurely upwards, interrupting our progress at intervals to feast on the strawberries and whortleberries which carpeted the ground, we presently came to the corner shown in the picture at p. 87, nearly under the highest point of the curve formed by the edge of the pine-wood above the glacier. Here we looked down upon the final fall, and could contemplate all the details of the ice at the point where the greatest dislocation is caused, by its pouring over the brow, and at the same time finding room, as is clearly seen in the illustration, to expand laterally.

The towers and pinnacles of ice which studded the region below us were indeed magnificent, but we were too far off for taking a photograph on a scale large enough to satisfy our wishes, and one or two of us began descending the steep and rather treacherous bank which sloped down to the glacier, to see whether we could thus approach near enough to the glorious groups of ice-needles. Meanwhile Christian had vanished in another direction, and we heard him making a considerable clatter round a slight projection in the hill side to our right, that is to say towards the Eismeer. Just as we had come to the conclusion that nowhere on this bank was there a thoroughly good view of the kind we desired, and that even if there were one the camera could hardly be made to stand there, we heard a well-known voice shouting "*es geht*," and bidding us follow.

None of us had noticed where Christian had gone, but we went towards his voice without much regard to the footing, which was of that delightful kind which serves very fairly if one goes fast, but is rather treacherous if one moves deliberately. In a minute we saw that he had discovered a spot at which the yawning chasm between the bank and the glacier was partly bridged by a rib of ice, and was engaged in cutting a staircase along the bridge. It was a long stride

from the rocks, worn smooth by the friction of the glacier, which has only ceased for a very short time, to the nearest tongue of ice; but the footing was good, and Christian's outstretched hand was scarcely needed. For twenty or thirty yards the glacier was so much broken that it required all his skill to devise a line of march, and a vigorous exertion of his powers as pioneer to render it passable; but matters gradually mended, and before long we were on the open central causeway before mentioned, as easily traversed as any part of the Eismeer. After exploring a little in the direction of the ice-needles, and satisfying ourselves that the only difficulty in finding a suitable group for a picture would arise from an *embarras des richesses*, we quitted the glacier on its right bank, and returned by the old and now neglected path to Grindelwald, resolved that the whole party, camera, ladies and all, should take the same excursion on the earliest convenient day.

We had not long to wait for the wished-for opportunity. On the first of September we commenced with this excursion (somewhat modified to suit the exigencies of the camera), a long series of days spent on divers glaciers—days of the greatest and most varied enjoyment, such as probably few parties, not professed mountaineers, have ever found themselves in a position to obtain. Almost every one who travels in Switzerland visits a glacier or two, but the thing is done in such a manner as to sacrifice nearly all the pleasure. Many persons have an unreasoning, though possibly natural dread of venturing on the ice; and of those who do set foot upon it, the great majority are soon satisfied that they have seen enough. The average guide is entirely ignorant of the structure of a glacier, and of all its varied phenomena, except perhaps some locally famous moulin; and people are soon tired, even if some of them know what to look for, of wandering without a definite object, when they can return to their

hotel at pleasure, especially as the walking is somewhat fatiguing, without rest, to those unaccustomed to it.

If however the same persons were to find themselves on a glacier, with the knowledge that they must spend a considerable time there, they would naturally be much more inclined to look at one object after another, and to sit and rest upon any convenient stone between whiles. This was with our party the effect of the photography, and the same end would be attained by sketching; those not actually employed in such a pursuit, while waiting for the workers, can always find ample occupation and interest; and though no stone on a moraine affords quite so comfortable a seat as an hotel sofa, yet the delights of the pure air and of the varied sights around, and the advantage of taking all the sight-seeing easily, more than recompense for any such slight discomfort.

That a whole party should thoroughly enjoy a day spent in this manner some few things are essential. One or two at least among them ought to be tolerably familiar with glaciers, and able to give assistance to the less experienced. If there be a really good guide with them, so much the better; but at any rate an axe or two must be available, to cut steps down to the edge of a moulin, or along a rib of ice, and by clearing away the disintegrated surface or stony covering of the glacier to disclose its inner structure. It is also desirable to bring luncheon, and a book or two for the delectation of the less actively disposed; and a couple of umbrellas will be found a most useful provision on a sunny day, since the heat, comparatively little felt so long as one is in motion and actively interested, soon becomes oppressive to those sitting still.

Almost before the day was wide awake, and long before the unoccupied inmates of the Adler hotel were thinking of turning out, our working detachment was on its way to the foot of the glacier, and

beginning with the terminal cave, edged gradually round towards the right bank, over and through the wilderness of moraine left by the retreating glacier. For once the early birds failed to pick up the choicest worm; while they were busily employed on their photographic task, the remainder of the party were enjoying a most extraordinary and glorious sight, which was entirely concealed from the eyes of those close under the glacier. Over the Wetterhorn the clouds so grouped themselves as to give the appearance of a second mountain superimposed on the real one. The wind was blowing lightly from the NE., and forming light thin clouds on the reverse side of the Wetterhorn, which rose into the air above it. These were riven and contorted into fantastic shapes, giving in minute detail all the appearances of a distant glacier. Here and there, where the sky showed dark and clearly defined through some gap in the clouds, there would seem to be the form of some gigantic rock rising through the snow-field, the illusion being aided by the circular motion of the currents of air. In fact the phantoms of rocks, plateaux of névé, ice-fall and crevasses, though constantly shifting, were repeated with such minuteness that the suggestion really seemed at first sight plausible that the whole effect was due to reflection from the Wetterhorn.

After breakfast the remainder of the party were soon got under weigh, Fritz accompanying them with a load of luncheon, and walked down to the edge of the glacier, according to previous arrangement. The photographic tent was on the point of being struck, and there was no more than time for the ladies to explore an ice-cavern or two, before a general move had to be made up the right bank. An amusing, but wholly unnecessary scramble up a steep bank of old moraine and a slope of smooth rock served to raise every one's spirits, and saved a circuit of ten minutes' walking by the expenditure of rather more time in climbing. Within a very

short time further we found a grassy knoll, closely overlooking the glacier, whence the accompanying view was taken.

FINAL FALL OF UNTER GRINDELWALD GLACIER.

The sight of a spot constructed by nature expressly for a picnic was too much for the photographic section, who had been on the move since seven in the morning, and now ravenously demanded luncheon. Christian and Fritz accordingly unpacked the basket, and young Ulrich procured from some neighbouring rill a skin-full of water, pure and cold, and delightful to drink provided it had not been left too long in the bag of waterproof cloth. The bread on

the Bernese side of the Oberland is always good, and the butter and cheese not to be despised, while the Adler hotel has an inexhaustible supply of sound Maçon wine, which seems all the better for being carried about for a few hours before being drunk. Altogether our lunch was so successful that we ordered a repetition of the performance every field-day until further notice: and thenceforward Christian's only enquiry of the commander-in-chief was for how many luncheon should be taken.

Even photographers are mortal, though they do live all day in a small tent where rival fumes contend which shall poison the air most effectually, and so they find food a necessity of existence; consequently our halt was considerably prolonged, to the great delight of Ulrich, who has a perfect mania for stone-throwing, and speedily infected M—— and T—— with the same disorder. Wherever a loose stone could be found, or a fragment of rock dislodged by the leverage of feet and alpenstocks, it was sent flying down to the glacier below, adding materially to the accumulations of moraine. Presently a move was again made; we were only a minute or two from the ancient path, which led us gently upwards under pleasant shade, until we emerged into broad sunlight on the bare rocky shoulder beside the top of the fall. Just beyond this point the glacier has by its recent diminution left bare some very remarkable striations on the smooth rock, the freshest and most perfect probably in all the Alps. We obtained one or two photographs* of these wonderful markings, and pocketed a few fragments of stone, deeply scored by the scratching power of some rock imbedded in the ice, and otherwise smoothly polished by the friction of ages.

* One of them is given in Chapter XIII.

Near at hand was the most convenient place for entering on the glacier, and we were proposing to convoy the ladies across, when Christian interposed an unexpected obstacle. He said that the plank bridge, which spans the main stream just below its emergence from the foot of the glacier, had recently been washed away, and not yet replaced; so that if the *Frauen* did cross and descend the left bank, they would be compelled either to return by a rough scramble over the lower end of the glacier, or make a long circuit to reach a distant bridge, neither of them agreeable suggestions. Under these circumstances we decided on returning the way we came; and the ladies were content with crossing to within a stone's-throw of the left bank, fairly into the difficult and broken part, and then retracing their steps. The group of ice-needles which we finally selected has been already pourtrayed in the photograph facing page 27; it is only one of many hundred similar clusters here collected, and perhaps not the finest, though the way in which the light happened to fall, and the remnants of moraine borne aloft on some of the ice pinnacles, made it specially suitable for our purposes.

Our return homewards was effected in the reverse order to the march out, the ladies and their escort moving off first and descending leisurely towards Grindelwald, while the photographic party stayed to complete their task. Such is a picture of many similar days spent by us on different glaciers, and on various accessible summits, more or less distant from our abiding place for the time being. We all saw far more of the detailed wonders of glacier scenery than many active and experienced mountaineers have ever had time to observe, and scarcely once was a single member of the party too tired for enjoyment.

Some fair readers will doubtless imagine that the ladies who belonged to our party were exceptionally strong and active, capable

of exertions to which they themselves would be unequal. But this was by no means the case: and it is just because they were of strength certainly not above the average, and yet were able by proper management to enjoy many unusual excursions, that it has seemed worth while to dwell upon the subject, in the hope that others may profit by their example. None of our lady companions, it is true, ever exhibited the slightest timidity about going on the glaciers, or walking in ice-steps properly cut, with or without assistance; but the only reason why any sensible persons ever feel such dread is that they do not know what the surface of a glacier is really like, and experience the natural human fear of the utterly unknown. Probably no one ever sets foot on a glacier for the first time without being agreeably surprised to find how easy it is to walk on it, and feeling astonished at the terrible pictures of its dangers and difficulties which ignorant people have drawn.

Generally speaking, it is less fatiguing to walk on a glacier than for an equal length of time over any other description of ground. The motion is more varied and less continuous; occasionally a few foot-holes have to be cut in the ice, which causes a slight delay, or each in succession has to be helped by a friendly hand where a crevasse requires an unusually long step; and the surface at all times undulates more or less, so that the continued steady tramp, which makes a path so wearisome, is entirely prevented. Moreover the ice is cool under foot, a most valuable preservative against fatigue, and the air is always pure and comparatively fresh.

In Swiss tours, as in all other forms of work, the great problem to be solved is how to obtain the greatest effect from a given expenditure of power. Mechanicians know the precise angle at which a pulling force should be applied so as to save friction as much as possible, and the speed at which machinery should move

so as to proportion most advantageously the wear and tear of its substance to the amount of work done. On the same principle a traveller of limited strength, who of course desires to obtain the greatest amount of enjoyment, and see the greatest number of new and beautiful sights, consistent with his or her powers, will do well to study the method of expending that strength judiciously. Ignorance of the real nature of glaciers doubtless deters many from visiting them; but many more exhaust their available strength without going near a glacier, through want of compliance with a few simple rules for making the most of it.

An English lady may not unfrequently be seen trudging laboriously up to the Bell Alp, or up the long hot valley which leads to the Grimsel. She arrives thoroughly tired, and no wonder: she finds herself unfit to join in the excursions of her companions for two or three days, and then it is time, according to previous arrangements, that they should move on elsewhere. The same strength, more judiciously expended, would have taken her to the top of the Sparrenhorn or Sidelhorn, a long way up the Ober Aletsch glacier, or to the Aar Pavilion. These pleasures are lost to her by disregarding the golden rule for ladies travelling in the Alps—*never walk where you can ride.* There is comparatively little fatigue in riding on a good path, and such as there is falls mainly upon muscles different from those used in walking. Nor is the heat, which generally is more trying than the mere mechanical exertion of setting one foot before the other, so much felt on horseback as on foot. A lady riding can easily carry an umbrella: in walking she soon finds it a serious burden. And since the region of horse-paths, the mountain valleys and lower passes, is necessarily hotter than the greater elevations where no paths exist, it is manifestly easier and more agreeable to walk in the latter than in the former.

A further question however arises, as to where ladies can ride with advantage; for in some places it is not only somewhat dangerous to go on horseback, but even more fatiguing than to walk. Every lady must to a certain extent decide this question for herself; but on the average it may safely be laid down that wherever a horse can take his rider in ascending, there he ought to be ridden. Descending on horseback a steep path, such as that of the Gemmi, is generally considered dangerous, and the attendants usually insist on every one dismounting. But a stronger reason for so doing is furnished by the fact that most people find it difficult to retain their seats, and infinitely more pleasant to trust to their own feet. Where this is the case much expense may be saved by dismissing some or all of the horses at the point where they cease to be useful.

It being then assumed that ladies reserve all their walking powers for places where riding is impossible, they may accomplish a great many excursions by the observance of another simple rule—*take it easy*. By not walking too fast, and stopping frequently, a lady of very moderate strength can walk distances one third of which, if unbroken by rests, would over-tire her: and those very halts afford the best opportunities for fully enjoying the scenery, not to mention the fact that nothing is more fatiguing than the abiding sense of having no time to spare. An early start is of course necessary, that is to say early in proportion to the actual amount of time requisite for the expedition; and an absolutely early start is obviously desirable, both because fine days often cloud over after noon, and still more because the ascending part of the day's work can thus be accomplished in less heat and consequently with less fatigue. Early rising is unfortunately not a general habit among English people, and sceptics have lately dared, in the teeth of countless proverbs, to question its sovereign virtues. But in the Alps there is no doubt that early to rise is the

only way to make a man healthy, rich in memory of beautiful scenes, and wise in all mountain lore: and the lawful fatigue of the day will usually dispose most persons to go early to bed.

To be honestly tired, to feel that you have fairly earned a good dinner, a lazy evening, and a night of sound, dreamless sleep, is in itself almost a luxury: at any rate every one who goes to the Alps, from the hardiest mountaineer to the most delicate lady, must reckon on being thus tired on every active day. But there is all the difference in the world between this healthy fatigue and being over-tired, which may be roughly defined as being too tired to eat with an appetite and to sleep soundly. The latter is essentially mischievous and to be avoided; if it does no permanent harm, it at any rate involves the loss of the time spent in recruiting. Once in a way, perhaps, a lady may deliberately expose herself to inevitable over-fatigue, in order to achieve some special expedition: but this is because she calculates it to be worth the cost, that in fact the one excursion is good enough for three or four days. The important precaution to be taken in such a case is, that she make no subsequent effort until really restored.

Individual strength varies so greatly that actual experience is the only means whereby each person can discover his or her own powers: and there is very little probability that all the members of any party will be found equally capable of exertion. It is easy however to guard against the stronger losing materially by having to wait for the weaker. By limiting the extent of a tour, and making it the object rather to see one district thoroughly than to cover much ground, the number of days on which an actual journey has to be taken is greatly reduced, and with it the chance of any one person delaying the movements of all by being previously over-tired. The majority of expeditions being thus made out and home again, any member of the party who feels yesterday's fatigue or is otherwise disinclined for

exertion, can on any occasion be left behind, without any inconvenience to others, at the cost of spending a more or less solitary day.

In thus attempting to show that ladies, who usually confine their attention to the beaten tracks, may easily ascend higher and penetrate further into the recesses of the mountains, we must disclaim any intention to disparage the scenery of the lower regions. The beauties of the Alps are so varied that every elevation, every mode of travelling has its peculiar charms; but the snow-clad mountains are after all their crowning glory. Lake and waterfall, pine forest and flowery alp, in all their countless combinations are most beautiful, and without them the higher regions would present an aspect of utter desolation: but these need not be disregarded because we appreciate even more highly the distinctive features of Alpine scenery, the everlasting snow-fields, with their marvellous offspring the glaciers, and the sky-piercing peaks whose giant feet they cover.

CHAPTER VI.

THE LAUTERAAR JOCH.

But soon
The silver-clouded east reveals
  The midnight spectre of the moon:
In half eclipse she lifts her horn,
  Yet, o'er the host of heaven supreme,
Brings the faint semblance of a morn,
  With her awakening beam.

Ah! at her touch these Alpine heights
  Unreal mockeries appear;
With blacker shadows, ghastlier lights,
  Emerging as she climbs the sphere:
A crowd of apparitions pale!
  I hold my breath in chill suspense,
They seem so exquisitely frail,
  Lest they should vanish hence.—LONGFELLOW.

DURING the whole month of September, 1865, the weather was absolutely perfect. Morning after morning the sun rose in a cloudless sky, and did his day's work for the busy camera with a precision and alacrity with which no mists ever dared to interfere; and evening after evening the mountains were lighted

up with gorgeous and ever new combinations of crimson and pink and rose-colour. Nowhere perhaps were these glorious sunsets seen to more advantage than from Grindelwald. The dark wedge of the Eiger, almost denuded of its snowy adornments, and the shapeless mass of the Mettenberg, glowed with a deep crimson light, as if red hot: while between them rose the vast white wall of the Viescher-hörner, their topmost summits tinged with a soft pink, all the more delicately beautiful from the contrast of the dark portals on either side. But grandest of all shone the Wetterhorn; its greater distance enabling the spectator better to understand and appreciate its magnificent proportions, and its grim precipices of dark rock, surmounted by fields of snow blushing a celestial rosy red, and crowned by a pyramid that seemed as if formed out of a pink topaz, combining all the beauties of all the neighbour peaks.

It has often been observed that the Wetterhorn fills in the imagination of tourists, even the most experienced mountaineers, a far greater space than it occupies on the map. Very slightly exceeding 12,000 feet in height, and overtopped by at least a dozen distinct and important peaks in the Oberland, as well as by numerous secondary summits, such as the Ebnefluh, Agassizhorn, and Schienhorn, it nevertheless attracts a general interest second only to the Jungfrau. The causes of this are not far to seek: unlike the Finsteraarhorn, the real monarch of the Oberland, the Wetterhorn occupies a position highly conspicuous, and well calculated to give an exaggerated impression of its size; a first-rate judge of mountain tops has pronounced its summit the finest in the Alps, except perhaps that of the Weisshorn; and for beauty, for difficulty of access, and varied interest in the ascent it can fairly compete with its rivals. The Aletschhorn may command a finer view, the northern face of the Jungfrau may appear more inaccessible, the Schreckhorn may be

really more difficult to ascend, but the Wetterhorn combining all these merits in a degree not greatly inferior may, like Themistocles after Salamis, put in a very plausible claim for the first place.

Nor does a nearer acquaintance tend to dispel the charm which the Wetterhorn exercises on the traveller seated comfortably before the Adler hotel at Grindelwald. At a very little distance above the village, all the three summits are seen ranged in line, or rather in *échelon*, the foremost, or Wetterhorn proper, standing boldly forward and almost appearing to overhang the pastures of the Scheideck, and the Rosenhorn, just seen beyond the Mettenberg, seeming to suggest a long series of similar peaks ranging back to an infinite distance. And though the peaks disappear from view as one approaches nearer, and are not again seen until one reaches the topmost plateau whence they rise but a few hundred feet, yet the ever varying beauty of the scenery may well compensate for the loss of that great satisfaction in Alpine climbing, the having one's work before one's eyes.

On leaving Grindelwald for the ascent of the Wetterhorn, the glorious view up the lower glacier is scarcely lost before the ice-fall of the upper glacier opens out, whiter and less blocked up by moraines than its neighbour, if in some respects less interesting. We pass the foot of the glacier, and soon begin to mount steeply under the shadow of the giant cliffs: presently the track ceases to ascend, and winds along at a level towards the right. The footing is in some places narrow, and at one or two points it is almost necessary to hold on with the hands, but it would not be hard unconsciously to pass the Enge, the supposed *mauvais pas* of this track, and wonder afterwards where the difficulty was. In a short time we reach a little grassy platform, just at the corner of the mountain, and the porters ask permission to halt, as wood for the bivouac fire can be found no higher.

Descending a little, and then ascending very steeply over some grass where a delicious spring tempts to a momentary halt, we reach the bare slope across the face of which it is necessary to pass. It is said that the notches, cut with great labour in the living rock, which very materially assist the traveller, were made by the legendary chamois hunter who first made a settlement at the Gleckstein : and the presumption in favour of this tradition is certainly strengthened by the very uncomfortable way in which some of the steps are made, it being only reasonable to suppose that this mythical hero, like the rest of his tribe, was free from some of the weaknesses which beset ordinary humanity. But these rocks do not last long; and then comes the chief glory of the walk, the view of the great upper ice-fall of the glacier, seen from the grassy knoll appropriately called the Schönenbuhl. As this view may be seen in the frontispiece, we abstain from attempting to challenge the descriptive powers of Apollo, for fear of sharing the fate of Marsyas at the hands of some charitable critic.

Between this knoll and the Gleckstein is a little bit of very awkward scrambling, with a fair chance of a ducking in crossing a stream, half torrent and half water-fall, which descends from the immediate neighbourhood of the cave. But this unpleasantness has, we believe, already become a matter of history : we were assured on all sides that before the season of 1866 the Grindelwald guides intend to improve the lower portion of the path, to place a couple of ladders against the nearly perpendicular rocks above the Schönenbuhl, which will give access to the Gleckstein in ten minutes instead of forty, and to build a commodious hut at some distance above the present cave. There are doubtless Alpine Tories who profess to lament the disappearance of every successive discomfort, and speak regretfully of the good old days, when the only shelter for the night before ascending the Jungfrau or Finsteraarhorn was in the dripping chink called by

courtesy the Faulberg cave—and it must be confessed that in those times the Gleckstein was by comparison a luxurious hotel. But its demerits are only too palpable to those who have sojourned in the new Faulberg hut, or at the Aar Pavilion; and we cannot pretend not to rejoice unfeignedly at the thought of no more nights of mingled cold and stuffiness in the Gleckstein cave.

The way thence to the summit of the Wetterhorn, or rather to the very elevated plateau, considerably the highest in the Oberland, out of which rise the actual peaks of the Wetterhörner, lies almost straight up from the Gleckstein, by a steep ascent of broken rocks, affording but insecure hold either for feet or hands. As the party which on August 25 was making the ascent was an unusually large one, and the difficulty of avoiding mischief from the fall of the stones which must inevitably be dislodged was proportionately great, the proposition of Christian Almer to try a new route was extremely well-timed. Diverging to the right a little way above the Gleckstein, we crossed a level shelf of glacier until it began to be uncertain where we could best attack a steep wall of ice and séracs which rose on our left. Christian and his favourite follower Johann Baumann went on to explore, and were soon heard plying their axes vigorously.

After a little delay we resolved to put on the rope and follow; and the remaining guide with the utmost politeness insisted on letting two or three of the *Herren* go first. We soon found that going first meant being exposed to a fire of ice-missiles which gave one the sensation of leading the storm of a well-defended fort: and the number of the party was too great, and some members of it too little accustomed to steep ice-steps, to admit of our getting out of fire by the true British soldier's method of taking the fort at a run. We therefore resorted to the only other device within our power, and ignominiously turning

tail fled downwards out of reach, until the cessation of the storm of fragments allowed us to ascend in peace. We now had it all plain sailing for some time, and gradually made our way to the base of a huge gully, shaped like half of an inverted funnel, which being well lined with firm snow took us easily and comfortably up to the plateau, very near the point where the usual rock climb also terminates.

After a moderate halt we started towards our peak, which only rose about 600 feet above our heads, our minds full of the graphic description of the first ascent, when Mr. Wills' party had to cut steps the whole way, and were finally obliged to hew out a trap-door through an overhanging cornice before they could set foot on the top. The slope grew steeper and steeper, but no step cutting : presently we saw that we were approaching a clearly defined line across the slope, beyond which we could not yet see, but expected to find a short bit of gentler ascent and then the last climb of all. We noticed that as the leader raised his head above this line he uttered a small shout, which apparently was intended as the most available substitute for a pat on the back to encourage those in the rear, but never for a moment imagined that we had reached the summit. Every one in succession seemed to be struck dumb with astonishment, when from a snow slope close to our faces our gaze suddenly passed to the green pastures of the Scheideck and the numberless hills of North Switzerland.

The summit of the Wetterhorn is, or rather was then, for it varies from day to day, a ridge of no width at all, until trampled down, just long enough to hold comfortably our party of ten. Some of us sat down to contemplate the view at our leisure, letting our feet dangle alternately over the northern and southern precipices, and manifested a decided unwillingness to move from our soft though rather cool

seats, when prudence prompted a downward course. We heard afterwards from our friends at Grindelwald that the waiter, divining by some process best known to himself the exact moment at which we should reach the top, had summoned them out just in time to see our heads rise in succession above the crest of the mountain, and that they had watched all our proceedings on the summit. Unfortunately we were not so well provided with telescopes, and were unable to distinguish them, or we might have exchanged our first greetings somewhat distant, not to say cool on our part—with some of our friends who had only arrived from England the night before.

The slope of the last two hundred feet was so extremely steep, that we found it convenient to descend backwards as if down a ladder, a process which may perhaps be safer and is certainly easier, but has the drawback of freezing one's fingers by the continual contact with ice or snow which is necessary to preserve one's balance. But on this occasion this mitigated form of torture did not last long; we turned round and made the best of our way downwards, in some fear lest our steps on the ice wall should have been melted by the rapidly increasing heat of the sun. The softness of the snow in the great funnel increased our apprehensions on this score, but fortunately also gave us every facility for reaching it speedily, as we could plunge down the slope as fast as we pleased. There was not very much amiss after all, and we reached the Gleckstein before one o'clock, very well pleased with our morning's work.

We subsequently learned that our route was not literally new, since some Englishmen with Zermatt guides were benighted in 1864 somewhere near the foot of our great snow gully, after crossing the Lauteraar Joch, and had the perseverance to ascend the Wetterhorn next day by a way similar to ours, if not identical with it, and to

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descend thence on Rosenlaui. This was however entirely unknown at Grindelwald, where the opening for traffic of an alternative route from that place up the Wetterhorn was heard of with great interest and satisfaction.

Our return to Grindelwald was the signal for another and penultimate burst of the bad weather so bitterly complained of by most of the August travellers, which cleared away in time for the Jungfrau expedition already recorded. After some days spent in exploring the capabilities of the lower Grindelwald glacier as regards both photography and picnics, it seemed that the time had come for a move in the direction of the Grimsel: and it was finally arranged that the ladies should find their own way thither by the usual road, and that the gentlemen, together with the camera, should arrive there simultaneously with them, *viâ* the Lauteraar Joch, which would involve another night at the Gleckstein, and the following of the Ober Grindelwald glacier to its very head. The camera and its appendages being pretty heavy, and the supplies for so large a party extensive, it was evident that two porters must cross the pass with us, in addition to our permanent staff; and as the preparations went on it soon became equally patent that two more porters must go as far as the Gleckstein, and return thence. Two men were accordingly sent forward, who were to beguile their leisure by collecting firewood on their way, and at mid-day two of us, sacrificing ourselves as usual to the camera, started with Fritz and Ulrich and the other two porters, leaving the remainder to follow after an early dinner.

We have a dim consciousness that we shall not encounter a good dinner again for about three days, and that neither one more meal off the cookery of the Adler hotel, nor the escape of two hours of the mid-day sun, are comforts to be despised. Nevertheless we turn our backs on these advantages, willing victims to the demand of the

upper ice-fall that we should go and photograph it, and start in fair spirits, not to the music of goats' horns and the shouting of excited adieux, but soberly as becomes Englishmen bound on an expedition of pleasure, and with a grateful remembrance of the comfortable quarters we are leaving after so long a sojourn. Half an hour passes, and the painful conviction forces itself on us that it is very hot, and will be hotter.

Two hours are gone and we are not yet at the Enge ; we think of our friends below, sitting comfortably over their dinner, and resolve that it would only be civil to drink their healths. Misery ! the wine has all been sent on by the first two porters, there is no water for more than an hour's walk, and the only drinks are tepid milk, or rather cream, too thick and too hot to drink with satisfaction, and neat brandy. We try combining them, and drink about half a wine-glassful of the mixture, just enough to make one feel very uncomfortable : there is no chance for us, but to toil on, picking here a whortleberry and there what appears to be a rose-berry, of which Ulrich eats quantities. At last we reach the Enge, flourish our hats for the benefit of any one at Grindelwald who may be interested in our movements, and away towards water, past a dirty torrent of which one is with difficulty restrained from drinking by the assurance that good water is close at hand, and then a rest and a drink, grateful indeed to weary body and mind.

After this there was enough in the path to keep up our attention, especially where a waterfall came over and through it, and necessitated a ducking for every member of the party. Of course it occurred to some one a few hours afterwards that we might all of us have been protected in passing by the waterproof cloth used for the camera : and of course we expressed our great obligation to the discoverer for his timely idea. As it was we got wet, and on reaching the Gleckstein

set our garments to dry at or rather over the fire, while we marched about in kilts improvised out of the blankets, familiarly *decken*. Out of this word, by the way, some one elaborated with great perseverance a joke about sleeping under *decken* (deck and) cooking our own victuals. The fire was lighted in the open air, but against the side of a rock, and later in the evening combined with the solitary candle that burned clearly and steadily in the still air, and the white light of the moon as it rose over the mountain tops to the left of the ice-fall, to produce one of those wonderful effects of light and shade which form so great a charm of Alpine bivouacs.

The porters had routed out the stock in trade of the "Hotel du Gleckstein," which consisted of an iron stand and pot and two rusty handleless reaping-hooks, with which they started off to increase the store of hay for our beds. While they were gone we ate a meal, and another when the rest came up and added to the picturesqueness of the scene, as they too stalked about in their quaint kilts. After gazing our fill at the lovely and varying tints of the evening sky, and watching Ulrich as he scrambled about over the nearest available rocks, his usual pursuit when not throwing stones, we were warned by the announcement that our nightcap of mulled wine was ready that bed-time was at hand. By common consent however we adjourned that question until after the moon had risen, and shown us the great ice-fall glittering with an unearthly splendour which reminded some of us of a bivouac years before under the shadow of the Bernina ; and then we prepared to turn in.

On a comparatively level piece of ground stands what appears to be a gigantic rock some fifteen feet high, but which in reality is two rocks fallen together, under and between which is the Gleckstein cave. A good working model of it may be formed by placing two books on a table one on the top of the other, and pushing the upper one till

it falls over the side of the other, and rests with one edge on the table. The original is in its internal capacity some fourteen feet long, and perhaps four wide, blocked up at one end with stones and having an opening at the other end about a foot and a half square, through which one has to enter feet foremost. Once inside, there is sufficient room to sit upright without any risk of striking one's head: and as the floor is thickly covered with many layers of hay, it is soft enough to satisfy any reasonable being, though undeniably damp. The waterproofs were spread over the hay, we put on slippers and otherwise dressed ourselves for the night, and then lay down on the waterproofs, each having secured what he could to serve as a pillow.

We lay two of us with our heads to the door and three to the walled up end; and whatever the merits of the cave may be in other respects, it must be admitted that five was close packing. We had no particular compunction about monopolizing the interior accommodation, for the guides had contrived a dormitory outside which was probably colder but otherwise not less comfortable than ours. They brought into camp after dusk, with an air of great mystery, some planks, whence procured we never heard, and laying these across from the great rock to a smaller one, formed a very fair roof over their heads, under which they spread a quantity of the fresh hay. Christian, who had already donned his wonderful woollen nightcap, which precisely resembles a chain mail helmet, closely fitting to head and neck, and leaving only his face exposed, spread the blankets over us, and then went off to his own bed: the candle was blown out, a few extra jokes made, and then silence.

But sleep is rather capricious in his attendance at mountain bivouacs: if he does not "steep your senses in forgetfulness" in about five minutes, you may calculate on being as wakeful as king Henry IV. all night long. First some one puts his foot on yours, and

after suffering a martyrdom of fidgets till you can bear it no longer you gently move your leg: a grunt from your neighbour very clearly conveys his estimate of your conduct. Next a strong though unfounded conviction takes possession of your mind that there is nothing between your head and the damp hay: you cautiously raise your hand to ascertain the fact, and a grunt from your other neighbour makes you feel as guilty as Macbeth. At last you settle down to stillness, suppressing out of deference to your neighbour's prejudices the intense longing to see if you cannot touch the roof with your outstretched hand. The silence is only broken by the murmur of the diminished stream flowing close outside the cave, by the thunder of some distant avalanche, and by the intermittent snoring which proceeds from the recumbent forms around: when the latter becomes unendurable a gentle whistle will infallibly stop it, at least for a time.

Thus occupied, the time passes slowly away—surely it must now be four o'clock, and quite breakfast-time: but there is no sound from the guides' quarter, perhaps another half hour's grace is safer. At length a match is struck, and reveals the horrible fact that it is only 2.30—another hour before we need move, as some one remarks with an obvious satisfaction that is extremely irritating. But even that hour before the dawn, the longest as well as the darkest, is gone at last; the candle is finally lighted, and the coverings carefully disarranged off the sleepers' feet, which soon has the desired effect of making them move. Then out into the starlight, and the crisp fresh air that in a very few minutes removes every trace of fatigue, and every wearisome recollection of a long sleepless night. The stars are shining every one with a brightness tenfold greater than on the clearest and frostiest night in England. The Pleiades for instance can be distinctly counted, and Orion, blazing just over the head of the ice-fall, seems to beckon us up to our pass.

Presently others appear on the scene: a fire is lighted, and around it are grouped weird figures clad in white, one or two of them looming "larger than human on the frozen hills," till the sun, that great dispeller of mysteries, sending a few beams of light to herald his approach, shows that the figures are only our friends with the blankets round their shoulders. Then follows breakfast—hot coffee, cold meat, bread and butter; and considering that it is more than four hours before our civilized time, we make not a bad meal. The traps are packed up, the entrance to our sleeping apartment carefully walled up, and our whole party moves off in single file up the stony hill-side, carrying with us a kindly recollection of the Gleckstein in spite of its discomforts, and the remembrance of moonlight scenes of the most exquisite beauty.

For some distance after leaving the Gleckstein our path was the same which some of us had trodden twelve days before for the ascent of the Wetterhorn; but warned by experience we made a long halt at the edge of the glacier nearly half an hour short of our old friend the ice-wall, while Christian and one of the porters went forward, the former to cut steps and the latter to enlarge and finish them. We had rocks to sit on, and a gorgeous view to occupy our attention; but it was rather too cold and too early to enjoy sitting still, so that all parties were ready for a start when at length the ice-staircase seemed sufficiently advanced. We put on the rope, went rapidly over the intervening space of glacier, and then began to ascend. To the point where we had on the previous occasion begun to wind round to the left our course was smooth and easy, as the steps were all ready and inviting us to walk up—so that we all ascended in fifteen minutes the staircase which it had taken at least an hour to make. Here we had to turn sharply to the right, and found that there was still quite enough step-cutting to teach the hindermost of our long Indian file by

practical experience the fact that chips of ice cut out and falling some fifty feet down a steep slope acquire considerable velocity, and are not incapable of inflicting bruises.

By eight o'clock however we had reached the vast and gently swelling snow fields which lie under the Mittelhorn and Rosenhorn, and were on a level, as we thought, with our pass, though still at a great distance from it: and we fully enjoyed our meal, sitting with our backs to our destined pass, on an elaborate seat made by laying all the axes and poles together on the snow, and contemplating the cloudless view, of which the Schreckhorn, here seen perhaps to more advantage than from any other point unless it be the Mönch Joch, formed the most prominent feature. The first glance in the direction of the Wetterhorn showed that we had not been a day too soon in taking our new way up it: the great funnel up which we had worked steadily and easily, and down which we had run and tumbled in the softened snow, was now bare rock, steeper and less promising than the well-known route by which the Wetterhorn is usually assailed.

The lateness of the season was destined to affect ourselves very seriously, as we found out in a very few minutes after our encampment had broken up. Before us lay vast fields of snow, falling away from our feet and rising again opposite us, broken by huge crevasses, some of them five or six hundred feet long, and lying at every possible angle to one another; and instead of "making tracks" directly for the pass, we were obliged not only to make a very long circuit to the left, but to resort several times to some curious manœuvres in order to get across crevasses which refused to be turned. This détour led us within a very short distance of the Rosenegg, as the Swiss government surveyors have, with better judgment than the English discoverer, named the pass between the Rosenhorn and Berglistock, and then under the steep cliffs of the latter mountain, which the Grindelwald

THE LAUTERAAR JOCH, FROM THE ABSCHWUNG.

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men engaged on the first and only ascent had magnified into a second Schreckhorn. We scanned its dark side with some interest, but without discovering any very terrible difficulty, and came to the conclusion, since confirmed by the narrative of the gentleman who made the first ascent, that the guides, having climbed one peak which Christian Almer did not know, had taken pleasure in exaggerating it to him. It presently turned out that our pass was to be made, not at the lowest point of the ridge joining the Schreckhorn and Berglistock, but considerably nearer the latter: so leaving the snow fields we mounted a slope to the left, cutting steps up the hardest and steepest ice of the day, where again a quick eye to play away the lumps of ice was exceedingly useful, and after a short rock scramble, looked at 10.45 down on the Aar glacier far beneath us.

The Col de Miage, under the western face of Mont Blanc, has been very appropriately compared to the Devil's Dyke, near Brighton, which preserves the continuity of the Sussex downs. The comparison is at least equally suitable to the Lauteraar Joch, for at the actual lowest point the ridge falls away so steeply as to be virtually inaccessible on both sides; while from its north-western face a narrow ravine runs for a mile and a half straight to the head of the great ice-fall of the Ober Grindelwald glacier. On the south-eastern side is a long straight wall varying considerably in height but everywhere extremely steep, which forms the head of the long Lauteraar glacier, on to which we were now gazing. This wall is very clearly seen in the accompanying illustration, which was taken from a distance of nearly four miles; and the spot at which we effected our descent, which lies beyond the little black peak to the right of the lowest point, may be identified by a faint streak of white still further to the right, which is the small icy slope down which we eventually had to cut our way.

After some minutes of descent over perfectly easy rocks, Christian, who of course was leading, suddenly halted, and gave the word to unrope. We could see in front of us the few yards of sloping rock that formed the shelf on which we were standing, and the level of the glacier far below: but not an inch was visible of the connecting link between the two, whatever it might be. Our leader speedily disappeared over the brink, the rope round his waist being paid out or drawn in by the two porters in accordance with his directions shouted from below; and in a few minutes he returned with the cheerful tidings that descent by the usual route was impossible, for that the glacier had sunk and the snow melted away so much that at the foot of the precipice, whence usually an easy slope of snow descends to the level of the glacier, there was now a further distance of bare smooth rock, and a yawning chasm between it and the ice.

But a way must be found somewhere; like Grant before Richmond, when he encountered insuperable obstacles on his intended course, Christian shifted his forces round to the left, and with unimpaired zeal and determination set about discovering a possible line of advance from the new quarter. While we sat and speculated as to the nature of the invisible precipice a few yards off, Christian again disappeared, this time at some distance to the left of his former point, and presently returned with his favourite dictum, *es geht*, on his lips: certainly it did great credit to his inventive powers to discern the possibility of a descent in this quarter. Fortunately we had two ropes with us, the shortest of which, seventy feet, was just long enough for the purpose for which it was required; so alpenstocks and axes were thrown over on to the glacier below, and thus lightened we prepared to descend.

Our second rope was tied round the foremost of the party, and he

sank below the verge in a slow and spider-like fashion, guided and directed by Christian, who went down in front, with minute instructions as to the exact places where some tiny ledge or cranny gave sufficient hold for toes or fingers. After going straight down for some ten yards, we made our way across the face of the cliff in a manner that more nearly resembled the progress of a fly along a wall than any mode of locomotion usually adopted by bipeds. Stowing away his first passenger in a cleft of the rocks, Christian re-ascended, and conducted each of the party in succession to the same spot: for our two porters, though pretty good mountaineers, were so heavily laden, the one with the camera and its adjuncts, and the other with the provisions and general properties of the company, that it was highly creditable to them to get down even with the maximum of assistance.

Last of all Christian came down alone, and of course unsupported by any rope from above, in some mysterious manner best known to himself, carrying with him the legs of the camera which had been very nearly left behind. Meanwhile the gradually increasing party had been stowed upon a little shelf of rock, constructed to carry about four with discomfort; and the arrival of each successive passenger presented a new problem in the science of packing close. At last the whole party were collected, most of them sitting on nothing in particular, and beguiled the time by smiling placidly at the glacier, or trying as well as their insecure position would allow to pelt the alpenstocks that lay on the snow beneath with detached fragments of rock.

As soon as one rope could be spared, Ulrich, as the only *expeditus* of the guide division, was sent off to cut steps down a short slope of dirty ice on our left hand, separated from us by a few yards only of comparatively easy rocks, which led down to a gaping bergschrund,

beyond which was the soft snow that covered the upper levels of the glacier. Much time was consumed on this operation, for the bergschrund could only be passed by a cross-grained bridge, very narrow and rather insecure, towards which, from the shape of the slope, we were forced to descend diagonally. As only two axes had been retained, and these were busily in use cutting steps, every one was obliged to rely for support entirely on his own unaided resources. At length the last man had crept over the bridge and floundered with a sensation of relief into the soft snow; and then Christian, who had been incessantly toiling for two hours and a half of comparative ease to every one else, looking back with an air of triumph at the conquered enemy exclaimed: "I don't believe there's a harder bit of rocks on the Matterhorn himself." Certainly the experience of none in the company could recal anything more difficult, though there had been nothing really dangerous. But the distance was so trifling that a small party might have passed in a fifth of the time: it was the greatness of our number which made our leader's task so long and so severe.

It was rather tantalizing to find that we must still go a considerable distance before we could rest and refresh with any comfort, and some of the hungriest were clamorous for an immediate halt. But the counsels of the thirsty souls prevailed, and it was resolved to go on till we should reach the open glacier and its welcome accompaniment, pools of clear cold water. Nor was it very conducive to general satisfaction to be driven backwards and forwards in a long series of zigzags among a set of obstinate crevasses, and once or twice to plod laboriously back up a soft slope down which we had just come. But at length the last crevasse was turned, and a slope, steeper and harder than the rest, beguiled us into attempting a glissade. Though a miserable failure from want of sufficient incline, our glissade raised

drooping spirits to a more appropriate pitch; and when about three o'clock the long-desired water was discovered, and we encamped beside it, there seemed a strong probability that our whole supply of food would be consumed long before there was any failure in the jokes which served to season it.

Now that the difficulties were past, there was much satisfaction in looking back on them, and in reflecting on the wonderful skill and strength displayed by Christian Almer in conquering them. The pass is so much longer than either of the others between Grindelwald and the Grimsel, that few care to cross it; and our experience cannot be said to recommend it as a practically convenient route. A great Alpine authority has said that no two things are more dissimilar than the same mountain at two different times, and very possibly the Lauteraar Joch may be an easy pass under ordinary circumstances. There is something not altogether pleasant, however, about a pass on which one is liable to encounter a state of things so awkward, that the place is only passable at all by favour of the valuable, but rather hazardous principle—*es muss gehen*.

CHAPTER VII.

THE AAR PAVILION.

For it's my delight, on a shiny night,
At the season of the year.—Old Song.

ON the morning on which we left Grindelwald, the box containing the store of chemicals had been packed together with our knapsacks, on the back of a miserable beast whose bent knees were a standing, or more accurately a stooping, protest against his being compelled to carry anything which could be damaged by occasional violent contact with the ground. The guides however were unanimous in declaring, in the equivalent German phrase, that though a bad one to look at, he was a good one to go—in fact that he was a quadruped highly distinguished for his carrying powers. To the proprietor of this animal we had entrusted a note, requesting the landlord of the Grimsel to send up some of the necessaries of life to the Aar Pavilion, there to await our arrival. We saw him start not without great misgivings as to the ultimate fate of box and letter: indeed the owner of the chemicals subsequently affirmed that he was seized with

palpitation of the heart on seeing the animal's first lurch, a statement which did not accord well with the agile manner in which he climbed on the Lauteraar Joch. But the lapse of some thirty hours had inspired us with more confidence, and now as we sat taking our hearty meal in the middle of the Lauteraar glacier, it was resolved that, while some of the party pushed on to the Grimsel, a photographic section should endeavour to find shelter for the night at the Pavilion.

The Grimsel detachment started down the glacier and were soon far in advance: the rest followed at a more steady pace, refusing to entertain the question as to their ultimate destination should the Pavilion prove untenable. In about two hours we were opposite our intended camping place, which stands on the left bank of the glacier at a height of some 300 feet above it, and at a distance of about three miles from its lower extremity. One of the porters was sent up to explore the resources of the place, and he presently shouted down some inarticulate remark, which by the aid of his gestures we construed into an assurance that it was all right. We scrambled up the steep ascent, and found that though no porter had arrived from the Grimsel, the door was not fastened. There was an ample supply of firewood, and also a copious one of *decken* and other conveniences. We soon determined on staying where we were: but as the store of creature comforts was extremely limited, the porters were sent off to the Grimsel, and we three remained behind with the two Almers.

The Aar Pavilion was built in 1843 by M. Dollfuss-Ausset, as a temporary home for himself and other *savans* while occupied in scientific observations, and it has always been kept in repair at his expense. It consists of a substantially built stone house, with two rooms on the ground floor, and a large loft over them accessible from behind, where the ground is somewhat higher than in front. The

inner half of one of the rooms is occupied by a raised stage, not unlike what may be seen in a kennel: and the stage, which is intended as a Bed of Ware, we found covered plentifully with hay, and spread with two or three blankets. In the same room there is also a capital stove, with two large iron pots fitting on to it, a number of iron rods, wheels &c., use unknown, which are very much in the way, a rough table and bench and two stools. But the most magnificent article of furniture is a cupboard, containing the crockery of the establishment,—two jugs minus their spouts, three or four teacups, and an iron spoon, and a few relics of former visitors, such as a broken thermometer tube, a few crystals left behind as worthless, and a piece of stony cheese. Our numbers being small on this first night of our sojourn, the room served us for parlour, as well as kitchen and bedroom; but it was afterwards christened the kitchen to distinguish it from the next room, which was termed the *salle-à-manger*, in virtue of its possessing a long table and two forms to match, but no other adornments whatever. A few yards off stands a small wooden hut erected in 1862, a *dépendance* in fact of the larger building, which in grateful remembrance of the Adler at Grindelwald, and the detached house belonging to it in whose *salon* we had spent many social evenings, was denominated the chalet.

By the time we had completed the exploration of our domain, Christian had raised a good fire: and we now turned our attention to supper. One of the party under the pressure of the emergency declared himself to possess a genius for cooking, and the others entrusted to him the stock of mutton, together with butter, salt and pepper *à discretion*, with an implicit confidence which was rewarded by the production of a most excellent dish. It has been asserted on high authority that every man in his heart considers himself the only person alive capable of poking a fire properly: it is at least equally

true that every traveller believes himself to be a born cook, and that every mountain pie into which he does not insert a finger or two will infallibly be spoiled. On this occasion however the two deputy cooks were so busily occupied in picking every scrap of meat off the bone that they could only spare time for an occasional entreaty to the *chef* for "more pepper:" and Christian was too intent on making tea, and Ulrich too profoundly impressed by the whole proceeding, for either of them to utter a word.

Both were delighted with the cross between a fry and a hash which was eventually turned out: and when the pan was empty, the whole party agreed that we had been justified in the extreme measure of dismissing the porters. The termination of our supper was as abrupt as the ending of Mr. Samuel Weller's valentine, and produced the same effect on our minds which he so sagely predicted the valentine would have on the mind of his sweetheart: for we certainly wished very heartily there had been more of it. When we had further consumed some unexceptionable but very mild grog, our stock of eatables and drinkables was reduced to half a pound of butter, a little pepper, a cubic inch of cheese, and as much water as we liked from the three small ponds, distant about a stone's throw, whence the supplies of the establishment were derived.

Very welcome under the circumstances were the sounds of extremely bad German which broke our slumbers about six o'clock next morning, and which proceeded from the mouth of a porter, who had been sent off from the Grimsel long before daylight by our attentive friends. Our letter to the landlord had been consigned to some mysterious bag, which had met with an equally mysterious fate on the journey: but as the horse with all our worldly goods arrived at the Grimsel some hours after our Lauteraar Joch companions had reached that place, the loss was not of vital importance. We turned out

immediately and appropriated one of the small ponds before mentioned as a tub, a luxury not often to be procured in the Alps, and rendered all the more pleasant by the fresh yet not too cold morning air.

Breakfast over, we retained the porter to carry the camera, and strolled leisurely back up the glacier, following the course of the gigantic moraine which marks the line of junction of the two main branches, called the Finsteraar and Lauteraar glaciers. Being on the Lauteraar side of the moraine, we found in our walk numerous crystals which had descended from the granite rocks of the Schreckhorn and its tributary peaks, and reserved them for future examination. This moraine has its origin in the Abschwung,* the rounded promontory which forms an abrupt termination to the lofty ridge running from the Schreckhorn through its kindred Lauteraarhörner. On either side of the latter descend the two great branches of the Aar glacier, already named, inclined to each other at an angle of about eighty degrees, and flowing from their junction for more than five miles in an united stream. Before arriving at this spot, we crossed the moraine to our left and took a diagonal line across the Finsteraar glacier, till we found a convenient place for pitching the tent on one of the minor moraines. Here the business of the day began, the first item of which was procuring the view already given of our yesterday's pass, the Lauteraar Joch.

The idlers, having unfortunately no precipice available whence they could hurl down rocks, and being but scantily provided with stones small enough for throwing, betook themselves to various occupations. The porter, whose night's rest must have been brief, lay down on his

* The Abschwung is clearly seen on the left of the picture of the Lauteraar Joch facing p. 109.

raff (a wooden frame similar in shape to those carried by glaziers in England, and universally used by porters on the Bernese side of the Oberland) and snored placidly all the day, an amusement in which the two Almers occasionally joined. The first task of the others was to construct on the summit of a pile of rocks, which were in fact the exterior covering of a gigantic ice-cone, a cairn into which was fixed an alpen-stock with a handkerchief attached to it, a flag visible more than two miles down the glacier. This was intended as a signal to our friends, with whom a rendezvous had been appointed for about luncheon time at a locality which had not been defined more precisely than as "near the Abschwung."

This accomplished to our satisfaction, we dispersed in various directions to explore the details of the neighbourhood: and M——, whose restless spirit ranged furthest abroad, presently discovered the most magnificent glacier table which any of us had ever seen. The table pictured at p. 62 gives a tolerably faithful idea of the mode of construction of this gigantic specimen of nature's upholstery, but is altogether inferior in size; the slab measured about eighteen feet in length by fourteen in width, and was elevated on a pedestal about six feet high. There being some fear of clouds intercepting the more distant views, we resolved to work them off first, and reserve photographing the table till the afternoon. A fatal resolution—for while we were lunching a thundering crash resounded in our ears, and one of the party jokingly suggested that it might be caused by the table falling from its icy pedestal, which turned out to be only too true. Satisfied with his first achievement, or disgusted by the ill-fortune which followed, M—— devoted the rest of the day to breaking up the stones we had collected in our ascent, and extracting the best of the crystals, which though clear were few of them remarkable for their size.

The whole of the Aar glacier is extremely rich in objects of interest; and a day is only too short a time for discovering and obtaining memorials even of those assembled within a very small circle round the spot where we on this occasion set up our standard. The larger elements of the view are however so incomparably grand that there is a great temptation to sit and gaze at the Finsteraarhorn, instead of prowling round in search of fresh dirt-cones and tables new. The ridge constituting the Lauteraar Joch can perhaps be more clearly understood from this spot than from any other on the east side of the pass: but the Lauteraarhörner which partially or entirely mask the Schreckhörner, and form the chief attraction of the view up this tributary, may be seen to much better advantage from the Pavilion, and other points lower down.

The crowning glory of the view from opposite the Abschwung is the Finsteraarhorn, which alone would amply repay the labour of walking up from the Grimsel, even were the way along a turnpike road between two whitewashed walls. This monarch of the Oberland, visible from few points of view which are moderately easy of access, seen from the Faulhorn only in profile, and not even from the Sidelhorn in perfection, rises in his full grandeur from the glacier bearing his name. On this side only can his devotees readily approach the base of his throne, and gaze reverently on his majestic form. There are higher precipices elsewhere, and more picturesque summits; there are mountain sides from which the climber turns away fully conscious that any attempt at an ascent would be too difficult to be hopeful, too dangerous to be justifiable; but the Finsteraarhorn as seen from this point produces on the mind an impression entirely *sui generis*. Not the boldest member of the Alpine Club in his most imaginative mood ever dreamed of scaling this mighty wall. The shadow of the Peak of Darkness (to quote Mr. Ball's eloquent expression), brooding for ever on

the surface of the level glacier, smooth and silent as a frozen ocean, seems to be cast over the beholder also, and to fill him with an awe such as even the Matterhorn is scarcely able to inspire.

As the afternoon wore on, and none of our friends made their appearance, we began to be in great uncertainty as to our movements. The supplies brought up in the morning were only intended to provide us with two meals already eaten, so that we must go down to the Grimsel if no reinforcements arrived. As things were we could not reach that refuge until after dark, and all our travelling property had been left at our sleeping quarters. Eventually G—— and Christian set off at full speed for the Pavilion, to pack up the traps and keep a look out down the glacier for our missing companions, until the camera and its attendants should arrive opposite the Pavilion. Everything was in readiness, Christian and G—— had packed on their backs all that was to be brought away, the photographic party were on the glacier below and waiting for the decisive signal which should tell that the Pavilion was to be abandoned to its solitude for that night at least, when three men were descried a mile off down the glacier.

Presently it turned out that our friends had at length made up their minds to come to the Pavilion; and that these three were but the vanguard of a host. Three ladies and two gentlemen, a *chaise-à-porteurs* which the ladies took in turns, Fritz, and the requisite number of human beasts of burden, were the somewhat formidable addition to be made to the party already in possession of the Pavilion. We hailed their appearance with delight at the prospect of carrying out a long talked of scheme, and of being spared a weary tramp down to the Grimsel; and in a very short time, the steep climb up from the glacier being accomplished, we joyfully greeted their arrival at our airy mansion. The ladies made up their minds to go at least up to the Abschwung on the morrow, and some of the

gentlemen had an idea (subsequently abandoned) of making the round of the Strahleck and Finsteraar Joch. On inspecting the stores it appeared that the essential article of bread had been very scantily provided; so the porters were induced, by the exhibition of a coin or two, to believe that their room was preferable to their company, and our friend of the morning, who had shown himself a handy fellow, was instructed to return on the morrow with more bread, again to devote his services to the camera.

This matter disposed of, the chalet was burglariously broken open, converted into a bedroom for the ladies, and furnished with all the luxuries available. The *salle-à-manger* was also called into use, and by the great principle of division of labour the sleeping accommodation for all parties was arranged and dinner laid very speedily. The guides kept us supplied with a succession of warm liquids, beginning with tea, and winding up with soup, which latter they had concocted for themselves, but found so good that they thought we might like to try it. Want of milk with the tea was perhaps the greatest drawback in the eyes of those who did not approve of that admirable Russian substitute, a few slices of lemon in the jug. The roughness of the entertainment seemed only to add to the satisfaction of all parties, though fingers supplied the place of forks, and paper of plates, and four clasp-knives could scarcely be deemed a plentiful collection of feeding implements for eight persons. Some efforts to construct spoons and forks out of splinters of wood were pronounced ingenious but not practical, though they served indifferent well to stir the sugar in tea or hot wine.

The rest of the evening passed quickly and pleasantly away, the moonlight effects on the glacier below us being an entirely novel sensation to half the party, and an unceasing source of gratification to all; indeed there was great difficulty in persuading any one that

bed-time had arrived. At length however all turned in, with unanimous expressions of faith in the weather; and silence reigned supreme. A quantity of the hay having been removed to the chalet, and the number of sleepers having been materially increased, the night did not pass away so pleasantly as the previous one had done. It had been agreed that some one must wake about three o'clock and shut the door, which was to be left open up to that time for ventilation; and when that chilly hour arrived there was no difficulty in finding at least one sufficiently awake for the purpose.

The next morning broke cloudy; two of the ladies however had the courage to persist in their plan of walking as far as the Abschwung; and they and their escort were rewarded by seeing the glorious view of the Finsteraarhorn in all its perfection. The rest went down with the camera, lingering on their way to photograph some of the numerous glacier tables and other objects of interest with which the lower end of the Aar glacier is replete.

One of these objects, singularly beautiful and, so far as our experience goes, perfectly unique, is represented on the next page. This was a fountain of very considerable volume rising out of the ice, and forming the origin of a large surface rill. Unfortunately the intense whiteness of the ice-bank behind the fountain, with the motion of the water, prevents the photograph from showing as clearly as might be wished this remarkable phenomenon, but it may be seen with tolerable distinctness by the aid of a magnifying-glass. A perfect crater of ice had been formed over the hole whence the water issued: this crater was about a foot in diameter, and nearly the same in height, and both inside and outside ice more loosely compacted had grown on to it. The quantity of water was so great, and its flow so forcible, that stones of two pounds' weight were carried over the edge of the funnel instead of sinking down it. We tried, as much as the water would allow, to

discover the construction of the funnel; but we were unable to ascertain with certainty either the original shape of the hole, or its depth beyond

A GLACIER FOUNTAIN.

the ten or twelve feet that could be plumbed with an alpenstock. We dropped large stones into the crater, and for several seconds small pieces of the loose ice broken off by the stones continued to rise to the surface. From the length of time during which these fragments rose, we arrived at the conclusion that the funnel was at least forty feet deep: but as the thickness of the glacier at this point is probably 200 feet, and we had no means of determining whether ice that could

be thus detached did not cease to form at a certain depth, this result is somewhat speculative, although it may be taken as approximating to the minimum depth.

In exploring the funnel we partially broke down its sides ; but on a subsequent visit a few days afterwards, we found them rebuilt, and the fountain restored to its former state, though the exterior deposit of ice had so much increased that at first sight the crater did not appear to rise so high above the surface of the surrounding ice as on the first occasion.

The explanation suggests itself that the water came from a surface stream which at some distance above had been engulfed in a moulin, and meeting with some obstacle in its sub-glacial course had forced its way again to the surface through a fissure in the ice. The water was so pure and clean that it could hardly have flowed along the actual bed of the glacier, but more probably had found a channel in the heart of the ice. The aperture through which the fountain rose was certainly not an ordinary crevasse, but was perhaps originally one of those deep water-holes so common on the Aar glacier, or possibly even a small moulin long extinct and now put to the exact converse of its former service.

At the Grimsel our large party was again re-united, and enjoyed the luxury of a real dinner and real beds, which some of us had not seen for three days. Our minds were also set at rest by finding that the chemical box had arrived without any breakage, which considering the means of transport may be reckoned a triumph of the art of packing. The remainder of the baggage had also arrived in safety, but what had become of our unlucky letter, or whether it was ever subsequently delivered, and if so whether the landlord was so deluded as to act on its instructions, we none of us ever ascertained.

The Aar Pavilion is by far the most desirable sleeping-place of its kind in the Alps, superior to all in size and consequent capability of

accommodating a large and heterogeneous party, at least as well furnished with comforts as the Faulberg, and only surpassed in position by the new hut on the Mönch Joch. It has further the advantage of being more quickly and easily accessible than any other; a *chaise à porteurs* was on this occasion brought to the brink of the glacier, whence it takes but a few minutes of scrambling to reach the house. Consequently this is the very place for ladies wishing to see near at hand the marvels of the ice-world, and no true lover of nature who makes the experiment in good weather will ever regret the venture. There is a certain amount of hardship, no doubt, in sleeping on hay, and in depending for twenty-four hours on food brought from the Grimsel by porters, and on the scant culinary resources of a stove and two iron pots. But the English nature seems to find a special charm in roughing it occasionally, and to many these very difficulties will be but new attractions. A large party has its obvious advantages, but ours proved quite large enough for convenience. The expedition should be arranged by some one tolerably familiar with Alpine bivouacs; and his labours will be greatly lightened if he can secure a couple of good guides as attendants, who will make themselves really useful, and know how to behave like gentlemen. It will add materially to comfort if the porters can be got rid of, their presence being often undesirable, and their eating and smoking powers unlimited.

By means of these precautions and the selection of settled weather, if possible at the time of a full moon, a visit to the Aar Pavilion may be made to give unalloyed enjoyment. And certainly no one can be said to have realized the full glory of the Alps until he has looked on this or some kindred scene under all its varied aspects, under the tinted rays of sunrise, the midday glare, the roseate glow of sunset, and the clear pale moonlight shining on the still sea of ice below, or reflected from the everlasting snows around.

CHAPTER VIII.

THE PANORAMIC SUMMITS.

Above me are the Alps,
The palaces of nature, whose vast walls
Have pinnacled in clouds their snowy scalps,
And throned Eternity in icy halls
Of cold sublimity, where forms and falls
The avalanche—the thunderbolt of snow:
All that expands the spirit, yet appals,
Gather around these summits, as to show
How Earth may pierce to Heaven, yet leave vain man below.

BYRON.

ONE of the greatest charms of the Oberland consists in the number of easily accessible heights belonging to it, whence may be obtained extensive and interesting views, on one side of the giant mountains and their glaciers, which are seen sufficiently near at hand for their grandeur to be fully appreciated, on the other of a wide expanse of lower country or distant peaks. It would be perfectly feasible to travel round the Oberland, and obtain a tolerably complete knowledge of its geographical structure from these views alone, without ever setting foot on one of the glaciers.

Individual tastes may differ—the picture presented from the Brévent by the range of Mont Blanc may by some be deemed superior to the kindred view of the northern face of the Oberland from the Faulhorn; the Cramont may possibly be ranked before the Schilthorn, and the magnificent circle of peaks around the Gornergrat may be preferred to the less grand but more varied prospect which rewards an ascent of the Æggischhorn. But even those who are least inclined to glorify the Oberland will admit that its minor mountains, taken as a class, cannot be equalled elsewhere: and they have besides the great advantages of being accessible quickly, easily, and from thoroughly good quarters, and of lying so near together that the chain of memory and observation is not broken in passing from one to another.

Of these panoramic summits, as they may very appropriately be termed, all, with the exception of the Schilthorn, were ascended during the month of September, 1865, by our party, or different members of it; and a brief sketch of each in succession may serve to show how complete a course of lessons they furnish on the geography of the Oberland, and at what small expenditure of time and trouble this series of glorious pictures may be witnessed.

It is an observation more common than creditable to the speaker's discernment, that "if you have ascended one mountain, you have ascended all," implying that all mountain views are alike. This is only true in the sense that many different points command views of the same mountains, so that in successive descriptions the same names recur: while of the very high peaks it may almost be said that from the top of each all the rest are in sight. Yet there is no greater mistake than to imagine that there is any sameness in the views obtained, for instance, from the panoramic summits which form the subject of this chapter. As one moves round a lofty peak not merely the details of its outline but its very characteristics seem to change.

The mountain which on one side presents a rocky precipice rises on another in a gradual slope to a sharp white point, and on a third in successive terraces of broken glacier: the peak which awes us by its stern and rugged massiveness as we gaze on it from the north, charms us in its southern aspect by airy curves and an outline of exquisite grace. If this be true of one solitary mountain, with how much greater force must it apply to a great number of mountains, at very different distances, individually varying and forming new combinations with each change of the spectator's position. The sameness complained of must surely exist in the mind of him who makes the assertion, and not in the glorious expanse of nature, which he fails to appreciate.

The most natural point at which to commence is the Schilthorn (9,728 feet), to which a new and melancholy interest attaches from the death of the young English bride, who was killed there by lightning in June, 1865, and whose sad fate is now commemorated by a cairn and marble cross, erected on the spot where she perished. This mountain is by far the least accessible of any of the series, as it involves three or four hours' journey from Mürren, the greater part of which is too rough for horses, and some portion of it over loose shale, the most fatiguing description of walking. In fact there are not very many ladies who would be willing to attempt the ascent at all, and none can be recommended to choose it as a first expedition; but the inexorable necessity of beginning for clearness' sake at one end of the vast horse-shoe traced out by the successive panoramic summits, compels us to take this stony walk at the outset of our imaginary circuit.

The great object of interest in the Schilthorn view is the grand range of cliffs, seamed with numerous steep glaciers, which extends from the Jungfrau along the farther side of the deep valley of Lauter-

brunnen, until it terminates in the bold form of the Breithorn. Up this stupendous wall, which constitutes in fact the north-western face of the Oberland, no path has yet been found except nearly under the Jungfrau, where at two different spots two parties of the best climbers in England have succeeded in scaling the precipices. There are so few worlds still left for the mountaineer to conquer that doubtless adventurers will ere long succeed in finding some other accessible point, but it may safely be predicted that no passage from Lauterbrunnen to the upper snows of the Great Aletsch glacier can ever be easy or devoid of danger. Beyond the Breithorn, and almost at right angles to the range extending from the Jungfrau, is the Wetterlücke, one of those mythical ancient passes which have been disused for a century or so, if they ever were used at all, and recently explored anew by climbers in search of novelty. A better defined pass can hardly be found in the Alps, and very few which are more difficult of access, except under favourable conditions. The narrow gap, with its curved line of snow, flanked on either side by a dark mountain mass, seems like the gateway into some vast fortress, guarded by two mighty and impregnable bastions. The Breithorn has proved accessible from another side, but its neighbour the Tschingelhorn as yet frowns defiance to all who pass either the difficult Wetterlücke, or the comparatively easy and frequented Petersgrat on its western side.

Tracing the southern boundary of the Lauterbrunnen valley until our view is interrupted by the nearer range of the Gspaltenhörner, we thence let the eye wander over the lower mountains and plain to the west and north, and, unable to identify one twentieth part of the hills and valleys within our scope, return to gaze with unwearied satisfaction on the Jungfrau range. The course of our projected flight lies north-eastwards, and as we note the two next summits on which we shall alight, the more distant Faulhorn almost in a line behind the

nearer height, we look in a direction parallel to the huge mountain chain which divides the Cantons Berne and Valais, and see beyond the Jungfrau, and as it were in profile, the Mönch and Eiger, which form prominent features in our next panorama.

Of the thousands of tourists who annually cross the Wengern Alp not one in five hundred seems to think of ascending the Lauberhorn. And yet an hour's walk from the inn at the top of the Wengern Alp, over grass slopes of very moderate steepness, will suffice to place even ladies on its summit (8,123 feet), whence, in consequence of the somewhat greater height and distance, the proportions of the Jungfrau, Mönch and Eiger can be better appreciated, their position relatively to the mountains which flank them on the east more clearly understood, and the two passes between the three peaks, two of the most difficult in the Alps, satisfactorily traced. In fact from the Wengern Alp the summit of the Jungfrau is not visible at all, as has already been observed, and but a very hazy idea can be obtained of the real form of the top of the Eiger, or of the exact route of the Jungfrau Joch. Gaining in pictorial clearness, the view from the Lauberhorn loses perhaps a trifle of the sublimity with which the Jungfrau cliffs seem to tower over the heads of travellers on the Wengern Alp path. If it were necessary to choose between the two views, most persons would with justice prefer that which is more impressive to the imagination. Fortunately there is no such rivalry; for both may be fully enjoyed within the limits of a very moderate day's walk. The view northwards from the Lauberhorn is somewhat limited, and inferior to that from the Faulhorn; and the main interest centres in the Virgin Queen of the Oberland, with her attendant chaplain and squire.*

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* The German names Mönch and Eiger signify respectively "monk" and "giant."

The direct view of the three associated peaks is lost on reaching the Faulhorn (8,799 feet), and they are again seen somewhat in profile, but in a direction contrary to that before noted from the Schilthorn. The *Hochgebirge* of Grindelwald, to borrow from a German work recently published, the collective title employed by three of their most persevering explorers, form the centre of the Faulhorn picture, with the peak of the Finsteraarhorn peering over from behind them. The wedge-shaped eastern side of the Eiger, so different in character from the aspect it presented towards the Schilthorn that it requires an effort of faith before one can realize the fact that the mountain is the same, forms the right hand limit of this picture: and though beyond it are ranked Jungfrau and Silberhorn, Blümlis Alp and Wildstrubel, far away westwards to the distant Diablerets, yet the main interest will be fixed on the group immediately in front of the spectator.

Behind the Eiger abuts the marvellous wall of the Viescherhörner, not broken, as it appears from the Eismeer, by the promontory of the Zäsenberg, but stretching away in a continuous ridge, nowhere less than 12,000 feet high, to the Finsteraarhorn, and conspicuously crowned by the chief summit, which from this point, if not from all, assumes the full dignity of a separate and important peak. The Finsteraarhorn, true to its retiring character, presents the minimum of surface to the eye, rising in an extremely sharp pyramid, far more slender than the Matterhorn in its most pointed aspect, and to all appearance perfectly inaccessible. The reasonably broad ridge by which the ascent is made is in fact turned edgeways towards the Faulhorn; so that, its inclination being exaggerated by foreshortening, and its thickness diminished by distance to a mere razor blade, its resemblance to the bridge Al Sirat becomes sufficiently appalling.

Beneath the Finsteraarhorn is seen the well-marked pass of the Finsteraar Joch, leading down to the Aar glacier which we have so lately been describing, and then the continuity of the distant view is broken for a short space by the shapeless hump of the Simelihorn, a higher but less accessible point of the Faulhorn group. To the left of this again rises the grandest object in sight, the appropriately named Schreckhorn,* grim and rugged of aspect from every side, and the most genuinely difficult mountain to climb in all the Oberland, if not in the whole extent of the Alps. Turning to the left again, we see the Lauteraar Joch, the dark square form of the Berglistock, and the three successive points of the Wetterhörner, terminating in the black precipices which overhang the Scheideck. The Grindelwald valley, and even the surface of the Eismeer, are hidden from us by the envious Simelihorn; and we begin almost to accuse of blindness the good people who made the path up to our present standing-place, because they did not prefer that higher coign of vantage. But a glance to the northwards makes us withdraw this charge, for at our very feet shine broad patches of the lake of Brienz, which give to the Faulhorn, infinitely superior in all other respects, a large share of the distinctive beauty of the Rigi and Pilatus.

These two favourite mountains, sole rivals of the Faulhorn in the convenience of having an inn actually on the summit, are full in sight to the north-eastwards, with a reach of the lake of the Four Cantons at their feet, and the Titlis group helping to fill up the gap between them and the Wetterhorn. But far beyond Lucerne and its lake the eye ranges over a vast expanse of country, to the dim line of distant hills which seem to continue the Jura round the whole northern half

* The word signifies "Peak of Terror."

of the horizon. Fourteen lakes are said to be visible from the summit of the Faulhorn, and though this number is doubtless somewhat beyond the truth, yet a view which includes the lakes of Neuchatel and Zurich is sufficiently extensive to warrant a liberty of this kind being taken with it.

The inn on the Faulhorn is the highest in Switzerland which has any pretensions to the name, the highest that is to say where people go to bed and a *table d'hote* is served: and though it is not one third large enough for the crowds that flock thither in the height of the travelling season, yet the risk of a little discomfort is well worth running for the sake of a sunrise and sunset, and there is no fear of being starved.

To watch the giant range of the Oberland lit up with the gorgeous colours of evening, to see

> "Headland after headland flame
> Far on into the rich heart of the west,"

and the crimson and orange clouds lying in uniform bars above the straight outline of the Jura, to gaze on the slowly changing tints until the snow peaks have all put on their robe of pallid white, apt emblem of the deadly cold which reigns over them during the absence of the sun, would of itself yield a rich harvest of beauties whereon memory could never be weary of dwelling. When the same excursion furnishes an opportunity of seeing all these glories return in the morning, and gradually "fade into the light of common day," it may safely be said that nothing in the Alps will more richly repay the traveller than a night spent on the Faulhorn.

The path up from Grindelwald is good and easy, so that ladies may ride every step of the way: and there are a variety of other routes by which the Faulhorn is accessible, that from Giessbach

being the most laborious, and that from the Scheideck the easiest and pleasantest of all. By this route we must descend, in order to make a start in the direction of our next panoramic summit, the Sidelhorn. Nature, so prodigal of admirable and accessible points of view on all other sides of the Oberland, has omitted to provide a good one anywhere near its north-eastern corner. Consequently we lose the opportunity of studying from a convenient height either the beautiful Rosenlaui glacier with its surrounding summits, or the vast and complicated mass of peaks and glaciers at the head of the Urbach Thal.

After skirting the whole eastern side of the Oberland we finally arrive at the Grimsel, where fortune again begins to smile. Out of the ridge beyond the Grimsel Hospice, dividing Berne from Valais, rises the Sidelhorn (9,449 feet), which for all practical purposes is a pile of loose stones. But as the slabs are large, the ascent is not especially fatiguing; and though horses cannot go further than the point, only half an hour from the hospice, where the road is quitted, a *chaise à porteurs* can easily be taken up, and will furnish a welcome relief to a party of ladies bound for the summit. The distance is not great, two hours sufficing for the whole ascent from the Grimsel, and the view to be obtained, if not the finest of the series, yet possessing singular interest in some respects.

The Sidelhorn is the last and lowest peak on the ridge separating the Oberaar glacier from the valley of the Rhone: and this ridge forms a most effectual dividing line to the view. Immediately under it to the right lies the Oberaar glacier, seen in all its straight and uniform length up to the pass of the same name at its head, the conspicuous gap between the shapeless Rothhorn on the left and the well defined black form of the Oberaarhorn on the right. Over the range which forms the other barrier of the Oberaar glacier towers the

matchless pyramid of the Finsteraarhorn, but far less overwhelming in its grandeur than when seen from the level of the glacier near the Abschwung, since the ridge dividing the two Aar glaciers cuts off more than half of its height. To the right of the Finsteraarhorn appear in the dim distance some of the Grindelwald peaks, but so crowded together that only the nearest of them, the Viescherhorn, can be identified with absolute certainty, except with a good glass on the clearest of days. And to the right of these again the sky-line rises gradually to the gigantic mass, shaped exactly like a double tooth, which generally does duty for the Schreckhorn, but is in fact the Gross Lauteraarhorn, and sinks again abruptly to the Lauteraar Joch, beyond which in a direct line is the Faulhorn, our last described point of observation—and so round, past a group of undistinguished mountains to the Grimsel valley.

The greatest marvel of the scene is the Unteraar glacier, whose gently sinuous course is seen perfectly, from the Abschwung down to its foot, and up the whole length of the Lauteraar branch. The contrast presented by the Oberaar and Unteraar glaciers is most complete and interesting. The former, coming straight down from a comparatively small field of névé, and possessing not a single tributary, has its smooth white surface unbroken by moraines, and until it begins to spread out in somewhat of a fan shape towards its lower extremity is cloven by scarcely a crevasse large enough to need an unusual stride. The latter, the combination of two immense ice-streams, one of which is itself compounded of four lesser ones, carries down its axis one of the largest and best defined moraines in the Alps, besides three smaller ones on the Finsteraar side.

Right of the Hasli Thal appear the imposing but not very lofty mountains separating that valley from the St. Gotthard, which terminate in the Galenstock and the beautiful glacier of the Rhone.

This with its huge reservoir of névé, its narrow and precipitous ice-fall, and broad fan-shaped end, displays a type of glacier totally different from those of the Aar, and more usually met with in the Alps.* In fact, except for the absence of moraines, it is an admirable specimen of the normal form of glacier; and this very exception, by leaving the ice more clearly visible, renders it easier to observe the real structure. Beyond the Rhone glacier and the Furca pass is seen in the south-east a somewhat confused mass of distant mountains, none of them important: and then in the nearer foreground the eye falls on the opposite boundary of the Rhone valley, stretching far away to the westward, and seeming to culminate in the ever beautiful Weisshorn.

We have now acquired a fair knowledge of those glaciers and mountain sides whence the melting waters flow down to form the Aar, and are carried in its rapid stream northward to join the Rhine. Here however we cross the watershed into canton Valais, and every brook or field of snow henceforward will be tributary to the Rhone, whose parent glacier lies almost at our feet as we descend from the Sidelhorn to the head of the Valais. Not many miles down is the quaint village of Münster, whence access may be obtained by a laborious ascent of 6,000 feet, to the Löffelhorn, another and higher point on the same ridge with the Sidelhorn. The distance however is so great as to exclude this mountain from our category of easily accessible summits, and the view is scarcely worth the trouble, being inferior in singularity and special interest to the Sidelhorn, and in grandeur to the Æggischhorn, the next of our panoramic peaks.

An ascent of some two hours or more, by a path steep in parts but pretty good throughout, conducts the traveller from Viesch in the

* See the Illustration at p. 23.

Rhone valley to the well known inn on the Æggischhorn. We need not linger, secure in a knowledge that good cheer awaits us on our return from the summit, but make our way at once up the horn. Horses can go more than half the distance, and the path above has been gradually and carefully amended till it is now easy enough. The last four or five minutes are over loose rocks, and somewhat under two hours suffices to reach the top (9,649 feet), which is furnished with a table and bench and a large wooden cross, visible far and wide.

Attention is at once and naturally attracted to the Great Aletsch glacier, sweeping down at a gentle and nearly uniform inclination from the Jungfrau Joch till it disappears from sight in the gorge of the Massa. This largest of European glaciers makes one bend, of nearly a right angle, in its course of fifteen miles, and the Æggischhorn rises on the outer side of the curve just at its vertex. We look straight up the glacier to the Jungfrau Joch, not without a feeling of wonder at the comparative insignificance of the southern aspect of both Jungfrau and Mönch, and mentally contrast the appearance of the two peaks and the pass enclosed between them with the very different shape assumed by their northern face as seen from the Lauberhorn, which, if the Jungfrau Joch were only a couple of thousand feet lower, would be visible over the gap. Turning our eyes down the glacier we see at the bottom the Bell Alp, with the Sparrenhorn, our next panoramic summit, rising above it.

The most striking object in the view is the superb peak of the Aletschhorn, towering up at the head of a tributary glacier just opposite the Æggischhorn, and dominating the whole range on the western side of the Great Aletsch. The Finsteraarhorn, the only mountain in the Oberland of superior height, merely shows its sharp cone above the nearer and comparatively uninteresting range of the

Walliser Viescherhörner, which form the left or eastern bank of the great glacier. Immediately at our feet, in the narrow ravine between the last named group and the Æggischhorn, is the Märjelen See, one of the chief wonders of the Alps. This is a small lake, at one end of which the ice of the glacier rises in cliffs some sixty feet above the level of the water. Masses of ice frequently become detached, and fall into the lake, where they float about as miniature icebergs; gradually they melt into fantastic forms, in which the most brilliant effects of coloured light may be observed, and occasionally are overturned, split asunder, and burst into fragments after the fashion of the genuine ocean wanderers.

To the eastward is the Viesch glacier, presenting, with its narrow sinuous shape, riven surface, and headlong descent, a remarkable contrast to the calm and equable flow of the Aletsch. If, as is believed, an arm of the latter ever passed through the valley now occupied by the Märjelen See, to join the Viesch glacier, it must either have changed its mind as well as its sky in running across the dividing ridge, or must have been utterly scandalized at the unseemly goings on of its new associate. Now however the Great Aletsch does not even deflect an inch from its path out of regard to the ravine of the Märjelen See, and the Viesch glacier is left to pursue its cross-grained course without external interference. At its head may be seen the Oberaar Joch, a pass whose two sides differ as completely as those of the Jungfrau Joch, though the smooth and easy side is not towards the Æggischhorn, but away from it, as we very recently saw from the summit of the Sidelhorn.

In the far east some dim peaks may be descried beyond the Furca pass, but the view in this direction, and round to the south, is in general bounded by the chain of mountains which separates the upper Rhone valley from Italy, culminating in the graceful Monte Leone.

Thence the eye passes to the magnificent peaks of the Monte Rosa group, and westwards to the huge mass of the Combin, which is frequently mistaken from this point for Mont Blanc: while on the farthest horizon, just visible over a rocky ridge beyond the Bell Alp, the snowy head of the veritable Monarch of mountains shines like a pure white cloud. Although our two remaining summits show us the giants of the Pennine* Alps from shorter distances, and on the whole to greater advantage, yet this our first view of them is by no means without its peculiar interest, even apart from the fact that it is the first sight of these vast "palaces of nature." The glimpse of Mont Blanc, in particular, gives to those who are fortunate enough to obtain it an impression of the distance within the eye's range, more vivid than is experienced on any kindred mountain, except perhaps the Schwarzhorn, far away in the centre of the Grisons.

Very different is the view which awaits us on reaching the summit of the Sparrenhorn (9,889 feet), after an ascent of some two hours from the Bell Alp hotel, the greater part of which can be made on horseback. As we pass from the Æggischhorn hither, and hence again to the Torrenthorn, the Pennine chain, which to each view forms the southern horizon, seems to alter like the changing figures in the kaleidoscope. The lateral ridges crowned by the rival peaks of the Dom and Weisshorn, and others farther away to the west, seem to shift their points of junction with the giant backbone: and all along, from the Fletschhorn to the Combin,

> Each pointed height and wavy line
> To new and other forms combine:
> Proportions vary, colours fade,
> And all the landscape is re-made.

* The general aspect of this range is described in the account of the view from the summit of the Nesthorn, in the next Chapter.

THE OBER ALETSCH GLACIER, FROM THE SPARRENHORN.

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The view of the Great Aletsch glacier is of course precisely the converse of that downwards from the Æggischhorn: we look up the broad incline of the great ice-river, till it curls away out of sight behind spurs of the Aletschhorn, and can just dimly distinguish white specks, which we identify as ice-bergs floating on the Märjelen See. The Aletschhorn also puts on a totally new appearance: instead of the graceful and sharply pointed cone which rises behind the broken snow fields whence descends the Mittel Aletsch glacier, we have now a massive rocky wall, somewhat resembling in general character the Finsteraarhorn as seen from the Aar glacier, but decidedly inferior in grandeur. This mountain is however seen to far better advantage from the level of the Ober Aletsch glacier, which flows between it and the Sparrenhorn, in a course even smoother and less inclined than its greater namesake.

The Ober Aletsch glacier, as seen from the summit of the Sparrenhorn, is an object of peculiar interest, though it is entirely wanting in those grand ice pinnacles and chasms which give to steep and broken glaciers their special charm. It illustrates in the most vivid manner the familiar comparison of a glacier to a river. Two great ice-streams meet, and flow downwards in a common channel: yet so similar is their inclination, so uniform in width and slope is the bed of the united glaciers, that scarcely a crevasse disturbs their calm and equable flow. Nothing interrupts the continuity of the almost level ice-field, except the long lines of moraine, their regular and well defined forms betokening the steady manner in which they are carried along. The Aletschhorn, and some at least of the moraines, are shown in the illustration, though unfortunately the angle was too great to exhibit the whole glacier, as well as the peak, in one picture.

Above gaps in the range which seems to run round from the Aletschhorn to the Nesthorn rise the tops of sundry distant peaks,

looking strangely like ghosts, cut off as they appear to be from all connection with the earth. The Nesthorn himself fares rather better, though even he is half hidden by a stony ridge which runs about north-west from the Sparrenhorn, concealing much of the upper regions whence the Ober Aletsch glacier is supplied, and forming the upper end of a desolate valley that lies on the western side of the Sparrenhorn. Over the opposite boundary of this valley we discern first the massive head of the Bietschhorn, the chief mountain of the beautiful and extensive though little visited Lötsch Thal: and further to the south, at a far greater distance, the colossal form of Mont Blanc, from this point as from the Æggischhorn the extreme western limit of the view.

A hot and steep walk from the Bell Alp down to Brieg, and a drive of nearly thirty miles along the Simplon road, and up the fine valley of the Dala, bring us to Leukerbad (the Baths of Leuk), at the southern foot of the Gemmi. Most travellers who cross that extraordinary pass halt for a night at Leukerbad, in order to have an opportunity of seeing the remarkable hot baths whence the place derives its name; and not a few are induced by the natives to visit the cockney wonder of the neighbourhood, the *Leitern* or ladders, by which access is gained to a hamlet perched above a limestone precipice on the left bank of the Dala. Scarcely any however visit the Torrenthorn (9,679 feet), the highest point in the range bounding the valley on the east. It is not the fault of the inhabitants that no greater notice is taken of the Torrenthorn, for an excellent horse path has been made to the very top, and engravings of the panorama are to be seen in all the hotels. Yet so little seems to be known of this marvellous point of view, which our whole party agreed in pronouncing the finest of all the panoramic summits, that even Mr. Ball's admirable guide-book is at fault respecting it.

THE OBERLAND MOUNTAINS, FROM THE TORRENTHORN.

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The accompanying picture will give some idea both of the view over the great mountains of the Oberland, and of the immediate foreground, by no means the least remarkable part of the whole. It shows in front the upper end of the small Maing glacier which lies on the northern side of the Torrenthorn, and which, as has before been observed, is no unfavourable example of the manner in which snow can become compacted into névé without the downward pressure of great masses of snow above it. The singular spires of dark red rocks that enclose its head are continued close up to the eastern side of the Torrenthorn in the like fantastic shapes; and the contrast between their precipitous forms and the gentle shaly slope which leads to the summit from the opposite side is most curious and instructive.

The Bietschhorn, whose magnificent rocky mass will be instantly identified on the right of the illustration, lies nearly due east from the Torrenthorn, at a distance of some eight miles. To the left of the Bietschhorn the lofty ridge forming the boundary of the long Lötsch Thal is continued into the Kippel Breithorn, and thence to the Schienhorn, between which two peaks lies the beautiful pass of the Beichgrat,* by which a tolerably easy access is afforded from the Ober Aletsch glacier to the Lötsch Thal. Over the gap between the Bietschhorn and Breithorn appears the Nesthorn, four or five miles farther away: and a careful observation will detect the line by which the latter portion of the ascent was made, as narrated in a subsequent chapter. Behind the Schienhorn towers the majestic Aletschhorn, and over the Lötsch Sattel, the well marked pass in the centre of the picture, rises the huge Finsteraarhorn, full twenty-five miles off.

* The Ober Aletsch side of this pass is shown in the illustration at p. 57.

If we turn now to the extreme left of the illustration, there will be seen the broad flat snow ridge over which is the easy pass called the Petersgrat, the established line of communication between the Lötsch Thal and Lauterbrunnen. On its right is the Tschingelhorn, and beyond that again the Lauterbrunnen Breithorn, appearing from this point, as from the Schilthorn, to be the conspicuous portals between which opens the Wetterlücke; while from the Breithorn a chain of dark precipices runs eastward above the Ahnen glacier, until it sinks into the snowy line of the Lötsch Sattel. Over the left shoulder of the Tschingelhorn is faintly seen the distant point of the Eiger, and over the black line of the Ahnengrat imagination may descry in the photograph, what was clearly visible in the reality, the extreme pinnacle of the Schreckhorn twelve miles beyond. Through the Wetterlücke, as through an opened doorway, we discern the noble form of the Jungfrau, with her north-western slopes of névé (by which our ascent, as recorded in Chapter III., had been so much facilitated), exposed to our view in profile, and the steep gully leading down from the Roththal Sattel on the side of Lauterbrunnen, immediately facing us.

It has seemed worth while to be thus minute in describing a view which is set before the reader's own eyes, because this seems an excellent type of all wide Alpine views, and illustrates well the manner in which more distant peaks and ranges combine with nearer ones to form pictorially one whole. With the aid of a good glass, to distinguish the outlines of distant mountains from those still more remote, and a tolerable amount of topographical knowledge, every feature in such a view as that of the Oberland from the Torrenthorn can be fully identified, and not a little enjoyment, in addition to that obtained from the general beauty of the scene, will be derived from thus recognizing old friends with new faces.

Substituting now the eye of imagination for the actual organ of vision, we turn to the northward, where rise close at hand the stupendous limestone cliffs of the Balmhorn, just to the right of the Gemmi; between which and the Petersgrat nearer ridges shut out all but small glimpses of the Blümlis Alp and its neighbours. Turning gradually to the westward, past the precipitous range on the other side of the Gemmi which limits our view for nearly a quarter of a circle, we look uninterruptedly down the valley of the Rhone upon Martigny, with the solid Dent du Midi, a veritable double tooth, raising behind it. This carries the eye on to Mont Blanc, seen to even greater advantage and in minuter detail than from the Nesthorn, and so along the great Pennine range, already sufficiently described, till the distant view is once more interrupted by the neighbouring chain, a little south of the Bietschhorn.

It may safely be pronounced that no other mountain at all easily accessible commands a view so varied in its charms as the Torrenthorn, though it is without those huge glaciers flowing past the very feet of the traveller, which constitute the special interest of the three summits which have been passed in review immediately before it. Placed as it is near the line of separation between the granitic formation of the main mass of the Oberland, and the limestone of the Gemmi district, it combines in one view some of the special and contrasted attractions of both species of rock, while its geographical position, almost equidistant from the Finsteraarhorn, Matterhorn, and Dent du Midi, and fully opposite the Pennine chain, is admirably adapted for giving an insight into the chief mountain groups of Switzerland.

The gap between the Torrenthorn and Schilthorn, though not so great geographically speaking as that between the Faulhorn and

Sidelhorn, yet requires a longer time for any but mountaineers to cross: and thus with the Torrenthorn our round of panoramic summits appropriately closes.

It must not however be imagined that these are the only heights round the Oberland commanding extensive and interesting views; though if a choice must be made, the mountains which have been described fairly deserve the preference, since they stand nearest to the snowy region, and afford the best insight into its recesses. The Niesen (7,763 feet), the conspicuous pyramidal mountain on the southern shore of the lake of Thun, is perhaps the most remarkable of those as yet unnoticed. Standing as it does at the junction of the Kander and Simmen valleys, with the whole expanse of the lake of Thun lying at its feet, it commands a more interesting prospect, independently of the snowy range, than its near neighbour the Schilthorn. Its position is also convenient for giving a general idea of the entire chain from the Diablerets to the Wetterhorn, or even the Titlis; and it also affords the best direct view of the northern face of the Blümlis Alp range: but from its greater distance it wants the charm of showing even this outlying portion of the Oberland in any minute detail.

The Gummihorn, and the more accessible Schienige Platte, which lie close together between Interlaken and the Faulhorn, are not much inferior to the latter peak in the view of the snowy mountains, and perhaps better placed for overlooking the lakes. The Rothhorn, behind Brienz, also commands a very similar panorama, being nearly intermediate in position between the Faulhorn and Pilatus. But on the whole the preference must be given to the Faulhorn over any of the latter mountains, not only on account of its greater height and accessibility, but also because it better fulfils the condition laid down at the outset, of combining a wide prospect in other directions

with a near and detailed view of some portion at least of the great central mass of the Oberland.

Although the facility with which all these panoramic summits may be reached has not been insisted on with any minuteness, yet it will be readily inferred that none of them involve any serious exertion: and this somewhat lengthy dissertation on their merits will not have been wasted, if it induces travellers, not ambitious of mountain honours, to believe that some heights of 9,000 feet are fairly within their reach, and to spend some of the brightest hours of their summer days in enjoying the wondrous beauties thence displayed. When their travelled French railway companion asks the patronizing question which the sight of an alpenstock inevitably suggests to his mind, whether Monsieur or Madame has made *l'ascension du Rigi*, they will answer that they have, or have not, with perfect complacency, secure in the conviction that they have beheld scenes of tenfold greater loveliness, and have studied them long enough to store their memories with a series of pictures, marvellous alike for the beauty and the variety of form, colour, and combination.

CHAPTER IX.

THE NESTHORN.

Before me lay, unfolded like a scroll,
The boundless region where I wandered late,
And mountains from their cloud-surmounting state
Dwarfed like a map beneath the excursive sight,
So ample was the range from that commanding height.—SOUTHEY.

AMONG the numerous pieces of good fortune which befel us in the course of the summer, scarcely one was more signal than the discovery which we made on reaching the Bell Alp, that the Nesthorn, the last important peak in the Oberland, was still unascended. Two or three of the company had passed a day or two at the Bell Alp a month earlier, and reported that one, if not two, parties, were bent on its conquest; and the hope was faint indeed that the prey would have escaped such determined hunters. Immediately a detachment was told off to be in readiness for the assault on the first convenient day. But business must first be attended to; the exacting camera must be followed about and kept supplied with work, on the Ober Aletsch and the Great Aletsch, up the Sparrenhorn, and down to the gorge of the Massa, until the ladies, who faithfully followed the wanderings of the "machine," began to think that a day would never come when they

could avoid going up and down the steep zigzags between the inn and the glaciers. And all the while one cloudless day succeeded another, and not an iota of credence was placed in the predictions of the self-appointed raven of the party, when he suggested the danger of yet another day's delay in seeing after the Nesthorn. At length, one Sunday evening, it seemed clear that there was no more work to be done, and arrangements were perfected for the march of one division the next day to take up a fresh position, while the storming party advanced to the assault of the Nesthorn under the immediate superintendence of the commander-in-chief, and the remainder performed other movements nearer head-quarters.

Accordingly, at 4 A.M. on September 18th, a small party, consisting of G—— and M——, with the ever-zealous Christian and his son, emerged from the inn into darkness rendered only more visible by the dim lantern in Christian's hand. We had not gone more than a few steps, and were just beginning to distinguish between the path and the heels of the man in front, when Christian halted, and called Ulrich up to him. A whispered conference ensued, in which the word *fahne* seemed a prominent topic; and then Ulrich disappeared into the darkness, to re-appear in three or four minutes with a long pole. There is reason to believe that Swiss law recognises no ownership in wood, at any rate when once cut; at least no one apparently has the slightest scruple about seizing any pole to which he may take a fancy for any mountain purpose, and the one we now carried off up the Nesthorn seemed to belong to the scaffolding of the new buildings of the hotel. However, conscience did not seem to make cowards of any of us, and we marched off coolly enough—perhaps one ought to say coldly, for the air was keen, and rapid going in the wake of a lantern almost impossible. Presently we missed our track, and spent a few extra minutes in a most unnecessary descent and re-ascent before we could find it

again: but before long day began to break, and depositing the lantern under a rock to await our return, we pushed on at a rather better pace, till we reached at 5.40 the familiar corner beside the Ober Aletsch glacier, just above the point where it begins to fall over to the great glacier below.

From the vast basins under the Aletschhorn and the Beichgrat which form its head waters, the stream of the Ober Aletsch flows in so calm and equable a fashion that a traveller, if he found himself on its surface encircled by mist, might well doubt which was the direction of its course. Delighted at having finished the steep ascent, and at finding ice under foot, we marched rapidly up the glacier, passing on our left the tributary glacier from under the Nesthorn (to be called in the revised Sheet 18 of the Federal map the Nesthorn glacier), up which,* and the tremendous wall of rocks beyond it, Christian Almer had a month before suggested going, if no easier way to the summit presented itself.

Soon we had also passed the opening on our right towards the Aletschhorn, and were beginning to round the base of the Nesthorn into the southern portion of the great basin under the Beichgrat. The map represents, and correctly, the two streams from the Aletschhorn and Beichgrat as of tolerably equal magnitude, and the axis of the united glacier as lying at about the same angle to each. But it is impossible to realize this when on the glacier itself: the Aletschhorn appears to send down a mere tributary, larger perhaps than that from the Nesthorn, but in no way the true source of the glacier. The huge field of névé, which seems to be the proper source, is in some respects one of the most remarkable in the Alps. From the foot of

* This is the side of the mountain shown in the accompanying illustration.

the most northerly spur of the Nesthorn, nearly three quarters of a circle might be described with a diameter of over 1,000 yards, the whole of which space is a nearly level plain of névé, almost unbroken by a crevasse, so that before the winter snow has been melted off, it is a smooth plain of snow, suggesting the idea of a frozen lake.

The appearance of a choice glacier-table recalled to our minds the fact that a second edition of breakfast was pretty well due; though it is only just to Mariette, the inestimable factotum of the Bell Alp inn, to mention that we had been served with a good breakfast punctually at the time we ordered it—a marvel unprecedented in all previous experience. It was unfortunate that regard for so superfluous a luxury as furniture (for seats were arranged in convenient proximity to our table) should have made us halt so soon: we could see most of the steep curtain that stretches from the Nesthorn to the Beichgrat, but not all, and we speculated throughout our meal as to the best way, in blissful ignorance of the fact that ten minutes' more walking would reveal a better route, nearer to the Nesthorn, and hidden from our halting place by a spur of the mountain.

In the Federal map is laid down what looks like a ridge, running from the Nesthorn to the Beichgrat in a direction a little S. of NW., which has no actual existence, at least as a ridge. The only real ridge running in any such direction is that which extends due W. from the Nesthorn to the Breithorn, which has on the south side a precipice of varying height, forming the head of the Gredetsch and Baltschieder Thals, (two narrow tributary valleys running southward into the Rhone valley), and gently sloping névé on the north side, which soon falls over to the great basin below, forming a huge curtain, very steep and in some parts much broken, in very nearly the line indicated on the Federal map by the false ridge. The mistake was doubtless occasioned by the existence of five great masses of rock, which protrude through

the névé nearly in line with each other, at about one third of the height from the level basin to the top of the curtain, and leave between them distinct breaches, one or two of them rendered unassailable by the deadly artillery of falling séracs, and two at least clearly practicable. The one between the two bastions nearest to the Beichgrat we had reconnoitred with care: it was decidedly the least steep, and looked easy if one could only reach its base. But as we pressed forwards, looking eagerly for the best way of attaining this object, we came in sight of another opening, the nearest to the Nesthorn, the foot of which was obviously far easier of access, and which would bring us out considerably closer to our peak. The slope between these two last bastions rose at an undeniably steep inclination, but was straight and smooth enough, and our only doubt was how many steps might be needed. But supposing we did find much step-cutting required the shorter our line of ascent the better, so we speedily decided to make the assault by this route.

In a very few minutes we found the slope so steep and the snow so hard that the rope became advisable, as there were a few crevasses lying at all manner of angles to our course, and even if we escaped a plunge into one of these a slide would be decidedly unpleasant. It was just 8.30, and Christian seemed to think G——'s suggestion of reaching the summit at mid-day rather premature; and so thought the rash speculator himself when boots ceased to make the slightest impression on the snow, and the axe had to come into play. It is certainly vexatious to feel that the delay occasioned by step-cutting is wasting precious and possibly invaluable time: but there is another side to this, as to all questions. There is some satisfaction in ascending without the slightest feeling of distress being possible, especially if the temperature is agreeable and the surface not too hard for a single blow to form each step: and there is a positive delight in

escaping from that most wearisome and uncomfortable mode of progression, working crab-like up a steep slope, balancing with each foot alternately on the two square inches of boot-sole which are all that will bite into the hard snow.

The provision knapsack was now transferred from Christian to his son, who persisted in spite of all offers of relief in carrying it to the top of the slope: and as our flag-staff was ingeniously strapped on across the knapsack, Ulrich presented exactly the appearance of an initial T taken out of Punch. Several hundred steps had to be made, but the majority of them were mere scratches, and progress was very tolerably rapid, till, just as the sun's rays reached us over the Nesthorn, we were fairly above the wall, and marching over gentler slopes. Exactly in front of us rose out of the ridge a very pointed rocky tooth, over or across which it would be no joke to pass, and the temptation was great to try steering straight up, so as to strike the ridge to the left of it. But the slope was very steep and unmistakeably icy, and after all we did not know what the other or southern side of the tooth might be like: so we tacked to the right, and soon found ourselves standing at 9.50 on the ridge overlooking the head of the Gredetsch Thal.

If there is one spot in the Alps whose barren desolation is utterly unredeemed by any beauties of nature or cultivation, it is the Gredetsch Thal, at least as seen from above: for the grand wall of peak and precipice at its head would be something to look at, if any traveller were insane enough to penetrate into the valley itself. Perfectly straight, very narrow, and bounded by parallel ridges of very uniform elevation, and with sides of débris inclined at an uniform and very steep angle, the Gredetsch Thal is the very image on a gigantic scale of an Indian *nullah* nearly dry, except that it is wanting in the one element of liveliness which the bed of a *nullah* affords, the chance

of an alligator's lunching off one's leg. At its head is a glacier basin, surrounded by precipices, as nearly perpendicular as disintegrated rocks can be, and not offering much temptation for a pass into it, even if such a pass would not be destitute of the great requisite of leading somewhere. At the spot where the ridge separating the Gredetsch Thal from the Baltschieder Thal, its next neighbour on the west, articulates into that of which the Nesthorn is the culminating point, stands a nameless rocky peak, nearly 12,000 feet high, whose base seemed to us smaller, in proportion to its height, than that of the Matterhorn himself, and which rather obstructed our geographical observations in this direction.

But all these were subsequent considerations: while the Nesthorn remained unconquered we had few thoughts to spare from our destined victim. So we sat down for a little while on the rocks at the edge of the precipice, and began to compare the map with the original. We saw at once that we could turn our enemy the rocky tooth by scrambling along the cliffs on its southern face; but the doubt was what to do then. Immediately behind it rose a snowy mass, not nearly so high as the Nesthorn might be expected to be, but so exactly of the right shape that we at first exultingly made up our minds that the prey was almost in our grasp. But some way beyond it appeared, over the left shoulder of the peak, swelling masses of snow which might easily belong to a higher mountain: and it seemed as if it would be necessary to round the steep icy northern side of the nearer one, in order to reach the other. This prospect was anything but cheerful; and as the map only marked one peak, and that on the watershed, it was obvious that either the nearer one was so insignificant as to be unmarked, or the further one, which did not seem to be on the watershed, was an impostor altogether. On the whole the best plan was to ascend the near peak, and then we should see.

THE NESTHORN, FROM THE OBER ALETSCH GLACIER.

To face page 154.

During this conference M—, having lost the thread of the argument, had joined Ulrich in his favourite amusement of throwing stones; and the pair were now busily occupied in demolishing the ridge piecemeal, and rolling the fragments down on to the Gredetsch glacier. They received with perfect unconcern the announcement that we were to go up one peak, in order to see whether we had not another to climb: and leaving all behind except the flagstaff, we moved off along the sort of trough formed behind the edge of the rocks by the melting of the snow during nearly four months of summer. We soon had to descend a little way on our right, and scramble along the face of the cliff on the southern side of the rocky tooth before mentioned. And this gave us a lively idea of what the pleasure of ascending this cliff from the Gredetsch Thal would be, as almost every step dislodged a perfect avalanche of stones, and we moved in a dusty cloud of our own raising. But this was soon past, and we found ourselves standing just beyond the rocky tooth again on the main ridge, here only about three feet wide, at the point which we had at one time thought of selecting for a direct attack from below. Under the circumstances we had clearly been right: but with different conditions of snow the other course might very probably be the easier and shorter, especially for descending.

Still hugging the edge of the precipice, and cutting here and there a step in the ice where the rocks gave no convenient footing, we came in less than an hour to where the nearer peak rose rather steeply for 50 or 60 feet above us on the left, standing back from the brink just far enough to allow the snow to curve up to it. A feeling which if not despair was first cousin to it came over us all as we reached the summit, and saw the real Nesthorn towering above us, beyond a gulf so deep that the slope from our feet hid the bottom, and covered with swelling beds of névé which suggested the idea that the

peak had grown fat in his old age. But another glance to the right showed that we might return to our old ridge, and follow it for at least some distance further, before steady step-cutting set in. No sooner seen than acted on; we came—up the wrong peak, we saw—the right line of attack, and it took us an unexpectedly short time to conquer. The rocks furnished us with stepping stones to within a very few minutes of the summit; and the snow, though very hard below, proved to have a softer layer above, just thick enough to let us pick our way without cutting. In twenty-five minutes from the minor peak we had reached the goal of our ambition: and with some triumph G—— was able to point out that it still wanted five minutes to mid-day, and that his morning prophecy had been fulfilled.

The summit of the Nesthorn is precisely similar in shape to the quarter of an orange; two perfectly vertical walls of snow form an exact right angle pointing eastwards, and the enclosed slope is rounded off in a smooth and uniform curve, growing steeper at every yard, till at one part it must be as nearly perpendicular as névé can ever lie. A few feet down each of the vertical walls there is a slight ledge, where the rocks crop out, and from which the mountain falls away in tremendous precipices, one of which may be seen in the illustration facing p. 150. Down on to one of these ledges Christian, thinking we should be more comfortable with a seat, requested us to lower him, and pulling out a large flat slab of granite poised it on his shoulder. We then hauled in the rope carefully, he digging his feet into the snowy wall, until we could lay hold on the stone, which was as much as one of us could lift. But it was no new thing to find Christian indifferent to all ordinary conditions of equilibrium, or ready for any exertion to increase our comfort; and it was only by active remonstrance, and ocular proof that both of us had room to sit down,

that he was prevented from going down to fetch a similar stone for the other Herr.

An hour of more unmixed enjoyment than that which we spent on the summit of the Nesthorn scarcely one of us had ever been fortunate enough to obtain. The air was warm and perfectly calm, the sky cloudless, and the view such as none of us had ever seen before. Christian, after deliberately reviewing the pretensions of every mountain which has high claims in this respect, gave the preference over all others to three Oberland peaks, the Aletschhorn, Viescherhorn, and Nesthorn, and placed the Nesthorn first of those three. A fourth peak, the Bietschhorn, ought clearly to be added to this list: but as no human being has ever seen the view from its summit there are no data for exact comparison. However, the Nesthorn is more easily accessible, and from better quarters: and some of the great charms of the Nesthorn view would necessarily be wanting, not the least of which is the Bietschhorn itself.

To do justice to the Nesthorn panorama would try the descriptive powers of a Ruskin; and yet it is impossible to resist the temptation of trying to give some idea, however faint, of its unrivalled glories:

> Though I am conscious that no power of words
> Can body forth, no hues of speech can paint
> That gorgeous spectacle, too bright and fair
> Even for remembrance, yet the attempt may give
> Collateral interest to this homely tale.

Looking first to the east, in the direction whither the shape of the peak itself seems naturally to direct our attention, we see immediately at our feet, its moraines dwarfed into mere dark bands on the clear white surface, the Ober Aletsch glacier, whence but a

few hours ago we looked up at our present eminence with feelings of hope considerably tempered by our total ignorance of what lay before us. Bounding the immediate foreground rises the steep uniform ridge that forms the eastern bank of the Great Aletsch, glowing crimson and scarlet with the autumn tints of the whortleberry and alpine rose; and far beyond towers the mighty mass of the Bernina, standing out dark and solitary against the pale green of the horizon. Southwards, to the right of the Bernina, the grey peaks of the Lombard Alps, sharp in the outlines of their actual tops, yet grouped so closely and so much obscured by the mists that fill the valleys as to render it impossible for the eye to distinguish their relative distances, form a background to the snowy range of the upper Rhone valley.

As we turn still more to the south, the spear-headed Monte Leone, and the massive Fletschhörner, needing no background save the blue ether, carry the eye and mind by ascending stages to the gigantic proportions of the Mischabel, lying due south under the mid-day sun, and crowned with its tiara of jagged pinnacles—on to the vast wall of the Monte Rosa range, flanked on the right by the steep bare tower of the Matterhorn—and thence to the culminating glory of the whole scene, the unrivalled Weisshorn, rising in solitary majesty far above its dependent peaks, and filling the mind with a strange sense of weird unearthly loveliness. The distant Grivola, just peering over the shoulder of the Matterhorn, is an addition not so much to the beauty as to the wonder of the scene.

Turning again westwards we gaze upon the graceful Dent Blanche, most difficult of mountains within Christian's wide and varied experience, and trace the line of the Pennine Alps, that shut out from us any further glimpse of the Italian mountains.

Seventy miles from us, at the western extremity of the Pennine range,

> Piercing the infinite sky,
> Mont Blanc appears, still, snowy, and serene—
> Its subject mountains their unearthly forms
> Pile round it, ice and rock.

But to the left of the monarch there are peaks that own no allegiance to him, rising in the dim distance beyond where the Pennine range is at its lowest near the historic pass of St. Bernard: so distant are they that we cannot hope to identify, we can only conjecture that they must belong to the Dauphiné group, at least 120 miles away. In the foreground are glimpses of the Rhone valley, contrasting well in its rich fertility with the black desolation of the Gredetsch Thal.

In the west we see the whole chain that forms the boundary between the Rhone valley and North-West Switzerland, running up, only broken in its outline by our nearest neighbour, the huge rocky Bietschhorn, from the head of the lake of Geneva to the Gemmi pass, and continued thence in the black precipitous wall of the Blümlis Alp, whose gentler western face is mirrored in the still waters of the Œschinen See. But from our present eminence we look far over the heads of Altels and Blümlis Alp to the long line of the Jura, bounding nearly a quarter of our horizon, and setting off by the intensity of its uniform tint of deep blue grey, the clear white of the steep glaciers hanging like robes from the shoulders of the Oberland giants. These are all before us, ranged in double or treble line, their familiar forms seen under a new aspect, each possessing its own individual beauty; and thus we revert to the starting point of our panorama, to feast our eyes once more on the Bernina. We soon discover that we have been overrating even that gigantic group, and have been putting down to the credit of the Bernina the heavy

mass of the Orteler Spitze, looming far away over its northern shoulder. Even yet we have not appreciated the full extent of the prospect. Three dark masses stand out against the horizon a little to the north; are they clouds, or mountains yet more distant even than the Orteler? In a few minutes we look again; they are still unchanged, and their outlines more clearly defined than ever; and the conclusion is inevitable, that they are the mountains of the Oetzthal, far within the borders of Tyrol, at least 130 miles away from us—the last observed and the most distant objects in the wondrous prospect.

We have the Laureate's authority for stating as a general principle that "Time driveth onward fast:" and if this is true in general, he drives a Great Western express engine on the top of a mountain. "Herr, I think we ought to be going down soon," says Christian; and we refer him to the flagstaff, which has yet to be fixed. But this is the very object he has in view: before the flagstaff can be planted on the veritable top, which is a small piece of overhanging cornice, each of us must stand there in succession, with a firm grasp on our coat-tails meanwhile, for fear the cornice should be seized with a sudden desire to visit its kindred snows on the Nesthorn glacier. This ceremony duly performed, the flagstaff is fixed into the snow, with a flag consisting of a dark cotton handkerchief and a yellow veil below it, a combination which at a few yards' distance bears a striking resemblance to the Beauséant banner of the Temple, which we, inheritors of their name and of their beautiful church, have a fair right to use.

We relapse into contemplation of the view, and are engaged in identifying the two hundredth peak or so, when Christian again interposes to suggest that possibly we may have to cut steps all the way down the wall. There is still one thing to be done, a memorial

fragment must be chipped off our stony seat, and consecrated by lying a few moments on the topmost pinnacle; and while this process is being carried on, Christian increases the dimensions of the flag, which is to be left to brave the snow-storm and the breeze, by the addition of a large piece of a *Galignani* out of M——'s pocket, which as he facetiously remarks has now probably attained the highest position of any newspaper in Europe. And now we are really off, and make the best of our way down by the same route, carrying with us the memory of a thousand things of beauty, to be a joy to us for ever.

It did not take us long to regain the level ridge where the knapsack had been left, nor to satisfy ourselves practically that no depredators had been tampering with its contents. While we were enjoying our well-earned luncheon, Christian, in his delight at the completed success, raised a genuine Oberland *jödel*, every note of which was faithfully echoed by the nameless peak a little to the west. We all took our turn in making the mountain sprite discourse sweet music, till it suddenly occurred to some one that there were two echoes; and on listening attentively it was clear that the sounds were repeated from the direction of the Nesthorn also. To test their rival powers, M—— and Christian stood back to back, and jödeled in concert, while G—— listened carefully to the separate echoes. Both were beautifully clear and musical, but there was a decided difference in pitch between them, so that they did not harmonize well. Doubtless they are contiguous keys in the gigantic harmonium on which the *Föhn* plays its stormy sonatas. But there is an end of all things, even of a *matinée musicale;* though our entertainment had been a trifle more substantial than such things usually are, yet it was sooner over, which is perhaps no drawback.

Taking one last look at the Pennine range, to be seen again no

more till we reached our hotel, we plunged downwards in the direction of the glacier basin. Much to our satisfaction, and a little to our surprise, we found the surface as hard as in the morning. The steps then made were still as good as new, and we descended as rapidly and easily as is consistent with treading continually in tiny notches cut into a hard surface. Near the bottom, where we had ascended without making any steps at all, we were obliged to cut a few; but they needed very little care, as no particular harm could happen even if any one should slip. The level of the glacier was soon reached, and with it the termination of all possible difficulty, and our release from the rope.

Two hours and a half more saw us at the Bell Alp receiving the congratulations of our friends, some of whom had been up the Sparrenhorn to look for us: though, as they had chosen 9 a.m. as the appropriate hour for descending again, they had not seen much of us. A good dinner and a bottle of champagne, presented by the landlord in honour of the only new peak within his dominions, brought to a pleasant close a day of perfect success; for, as Christian put it, we had taken the best possible route throughout, and had enjoyed the best possible view to reward our wisdom.

CHAPTER X.

THE BELL ALP AND ITS NEIGHBOURHOOD.

Why to yon mountain turns the musing eye,
Whose sunbright summit mingles with the sky?
Why do those cliffs of shadowy tint appear
More sweet than all the landscape shining near?
'Tis distance lends enchantment to the view,
And robes the mountain in its azure hue.—CAMPBELL.

IF the Bell Alp, which is a retired slope of green pasture, were capable of feeling the emotion of modesty, it would surely blush to find that its name has been stolen from it, and unaccountably become famous elsewhere. Blush it does, more usefully than with shame, with rhododendron and whortleberry, from the latter of which comes one of the favourite dishes set before the sojourners at the miscalled Bell Alp inn. Hardly the Riffel hotel itself is so well situated as this pleasant house, overlooking from its back windows the broad stream of the Great Aletsch glacier, and in front commanding a wide view over the Pennine Alps. It really stands at the corner of the Lusgen Alp, a mile or two away from the nearest point of the true Bell Alp; but natives and foreigners combine to call it by the latter and

more euphonious name, and since what everybody says must be true, the conclusion is inevitable that it's a wise Alp which knows its own godfather.

The Æggischhorn inn has been long and deservedly a favourite with all classes of travellers, at least of English travellers, for Germans have been known to complain that the landlord cares for no guests but the English: and its proximity to the principal Oberland peaks, to the celebrated panorama from the summit of the Æggischhorn, and to the wondrous Märjelen See, would earn for it high repute, even if the accommodation were worse than it is. But because the Æggischhorn is delightful it does not follow that its neighbour the Bell Alp should not be pleasant also. Tourists who have any real or fancied cause of complaint at the one, go off to the other, and abuse the rival establishment in the visitors' book, thus tending to excite a most needless feeling of hostility between the proprietors; but in reality the two places are scarcely rivals at all, and the best thing any traveller can do is to visit both, especially if he take the direct route from the one house to the other.

It is perfectly possible to descend the length of the Great Aletsch glacier, and come straight to the Bell Alp from the corner of the Märjelen See, though the ice is so much broken by crevasses as to render this walk more laborious than interesting. The ordinary route is by an easy path along the verdant Alps which lie outside the rocky ridge forming the left bank of the great glacier, as far as the Rieder Alp, exactly opposite the Bell Alp. Thence a series of steep zigzags has been made down to the level of the ice, and a path almost equally steep leads up the opposite slope to the inn; while the passage of the glacier at this point presents so little difficulty that horses and cows are frequently led across. Up to the present time the inn has been but a small place, scarcely accommodating twenty guests, and

suffering a little from its proprietor owning another and much larger hotel in Brieg; but during last summer an additional building was erected more than double the size of the old house, and the landlord proposes henceforth to devote to it his exclusive attention. What it may lose in retirement and the charm of simplicity it will gain in comfort, and in the certainty that in future travellers will not arrive late and tired to find the house full. A more delightful spot for a sojourn of several days it is impossible to imagine : the elevation is very considerable, not less than 7,000 feet; there are two peaks matchless for beauty of view each within the reach of a single day's walk, and several excursions of minor length and very considerable interest. Should the fatigues of previous expeditions, weather, or any accidental cause, incline the visitor to total rest, he can contemplate from the windows the magnificent forms of the great group of peaks which encircle Zermatt, the mass of the Fletschhörner, scarcely less imposing, because nearer, and the chain of less distinguished summits which continue to the eastward the main line of the Alps.

Although the outlines of this superb range soon become familiar, yet scarcely any amount of observation will exhaust all their varied aspects of beauty. The slightest changes in the direction of the shadows alter the view to an incredible extent, and the fluctuations of the weather are equally potent. It is hard to say under what conditions the mountains are most beautiful, whether glistening in the sun with the pure dazzling white due to fresh-fallen snow, or shining a dusky silver in the moonlight—standing out clear and sharp against a horizon of unbroken blue, or set off by a background of purple thunder clouds, at the moment when

> the vanward clouds
> Have spent their malice, and the sullen rear
> Is with its storéd thunder labouring up.

The glories of an Alpine sunrise are scarcely known except to mountaineers: in the English climate, and with English social customs, very few people ever see a fine sunrise, and consequently they have no habit of looking for one, as they naturally do for a sunset. The Bell Alp is however the one place in all Switzerland where sunrise can be enjoyed with the least trouble, and by no means to the smallest advantage; and there is a singular attraction about the sight which seems to wake half the inmates of the house on purpose that they may witness it. Without even the trouble of getting out of bed, one may see the first blush of pink tinge the highest summits, and creep gradually down their sides, the colour deepening and growing more vivid as it spreads, till all the upper snows are suffused with a warm crimson light.

Beautiful as is sunrise upon the mountains, there is a still higher charm about sunset: whether it be merely the greater splendour of the colouring, or the tinge of sadness which seems to accompany the fading away of the light, the poets are clearly right in their preference for the down-going of the orb of day. The Bell Alp is exactly at the distance from the Pennine range best suited for showing to advantage the sunset effects upon and beyond those mountains. They extend along the southern horizon opposite the point of view, and are not so near, or so much higher than the Bell Alp, as to conceal the clouds lying at nearly the same level beyond the range. Thus peaks and clouds are lighted up by the same rays, and the picture formed by them changes its hues uniformly, and with due accord to harmony of colouring. The roseate tints of the mountain snows, varying in shade from the palest pink to deep burning crimson, contrast admirably with the darker hues, orange, green, purple, with which the horizontal light tinges the evening clouds.

September sunsets come at an early hour, and the worthy Mariette

did not altogether approve of the whole company leaving the dinner table between every dish, and gathering at the windows to watch the rosy light spreading over the Weisshorn and Dom, or tipping with fire the giant spear of Monte Leone. Probably she became accustomed to it, for evening after evening the same gorgeous diorama of slowly changing colours was spread out before us, and lured us from the table to gaze with ever increasing interest. What was the special condition of the atmosphere, or how the effects were produced, our philosophy could not even guess, but we certainly saw sunsets never within our experience equalled for variety of colouring. The sunset light seemed to last an unusually long time and to vary its hues very gradually: and when at length the colours faded entirely, the ghastly white, which usually succeeds them, scarcely showed itself, so that we turned away without the sensation of having witnessed the death of the day, and could all the more confidently believe in an equally glorious morrow.

On the Sunday afternoon which preceded our ascent of the Nesthorn we were surprised to find the neighbourhood of the inn swarming with people, tenfold more in number than the little hamlet near at hand seemed capable of accommodating. Presently we saw multitudes of sheep and goats converging from all quarters, and learned that this was the time of the autumn collection of all the flocks which find summer pasturage on the higher slopes. On a given day all the animals are driven down to some convenient spot, where on the following morning the several owners reclaim them from the shepherds in charge, and carry them off to their homes in the villages. The occasion is regarded as a festal one, for which Sunday is to them the most appropriate day; so after morning mass a large proportion of the neighbouring population make their way to the appointed place. How the small colony on the Lusgen Alp managed to find room for so many

visitors we never ascertained, for we were all on the move in different directions the next morning too early to see the dispersion of the assemblage. By the Monday evening all had so completely disappeared that the Nesthorn party were unable to find any one interested in the fate of a stray sheep, which they had encountered close to the Ober Aletsch glacier, somewhat lame, and wearing on its black face an expression of the most pitiable perplexity and bewilderment.

During the whole Sunday afternoon the immediate neighbourhood of the inn was crowded, not quite so thickly perhaps as the banks of the Serpentine on a fine Sunday in summer, but still in a manner which contrasted strongly with the usual quiet of the place. A favourite amusement with the men seemed to be prowling about the unfinished buildings, examining their construction with a critical eye, and taking giddy walks upon the open beams. Young Ulrich, who is cat-like in his propensity for perching himself in uncanny places, was in all his glory, and was never contented until he had persuaded two of the *Herrschaft* to climb a rickety ladder and promenade the rafters. There they found Christian seated at an angle of the building, engaged in conversation with an elderly gentleman possessing a curiously weather-beaten face, a terribly long tongue, and most evil-smelling tobacco. As the old fellow, ignorant that he was talking to so experienced a guide, and pleased at the opportunity of humbugging an Englishman, gave utterance to one statement after another which it would be no breach of civility to call downright lies, it was most amusing to watch the expression of Christian's face, and the keen enjoyment with which he led his gossip on, knowing perfectly well that his two *Herren*, who were intended to take all the rhodomontade as gospel, were at least as well acquainted with the truth as the old romancer himself.

From the top of the house it is easy to descry with a glass the *wasser-leiter*, as the natives call them—the rough wooden channels, in some places no more than the hollowed trunk of a single tree, in which water is conducted at a great height for the purpose of irrigation, along the side of the deep ravine of the Massa. These narrow and slippery planks, in some places so loosely attached to the mountain side as to threaten a fall, afford the only means of traversing the whole length of the gorge. There had been some talk of our descending by this route to Brieg . but Christian was averse to it, saying with his usual good sense that while there was nothing to be gained as compensation for the risk, it was really dangerous ; and the distant sight of the only means of descent was quite enough to convince us all of the wisdom of his objection. It is obvious that these water-troughs do not grow stronger with the lapse of time ; natural decay, the constant wear of the water, and the severe strain occasionally produced by a human body passing along a structure ill calculated to sustain such a weight, must very rapidly undermine the constitution of the *wasser-leiter*. What was safe two years ago may very probably be dangerous now, and positively rotten next year ; while it is impossible to ascertain whether any given spot is secure until the whole weight is ventured upon it, and a fall would be certain death.

It by no means follows, however, that because descending by these frail supports is a dangerous pastime, the gorge of the Massa may not be visited with perfect security. The whole lower end of the Great Aletsch glacier may be traversed in almost every direction by means of a little scrambling and step-cutting ; and at no great distance below the termination of the ice is a lateral opening on the west side of the gorge, through which a track leads to Blatten, the

small village halfway up the steep ascent from Brieg to the Bell Alp. Thus a most interesting and delightful round may be made from the inn, with the sole drawback that it involves at least an hour's ascent at the end of the walk: or one may descend to Brieg *viâ* the glacier, and emerge into the ordinary path at Blatten. It is greatly to be regretted that no safer line exists for walking the entire length of this noble gorge, on whose beauties Mr. Ruskin's eloquent pen has showered all its superlatives. In narrowness and in the perpendicularity of the bounding cliffs, it is surpassed by the gloomy ravine of the Tamina, which affords an outlet to the steaming waters of Pfäfers, and the Via Mala is altogether on a larger scale. Nevertheless the gorge of the Massa may well claim to rival in sublimity either of these celebrated valleys; it is more natural, so to speak, than Pfäfers—does not suggest the idea that one has somehow fallen into a gigantic crack in the earth, which is the first and not very sublime impression conveyed by the ravine of the Tamina; and at the same time it is more uniform and continuous than the deepest gorge of the Via Mala.

The picture given on the opposite page, which shows the termination of the Great Aletsch glacier, was taken from a little distance above the opening towards Blatten, and therefore conveys but a very faint idea of the narrowness of the gorge lower down, though it may serve to show something of the grand and precipitous character of the cliffs on each side, and of the manner in which the pines, those hardy pioneers of vegetation, extend their ranks almost to the point where the walls of the ravine become vertical. From the actual termination of the ice nothing can be seen, on looking down the gorge, but its own bounding precipices, since a curve in its course shuts off the prospect out into the Rhone valley. Probably the finest point of view near the foot of the Great Aletsch glacier is on the ice a few

hundred yards up, sufficiently high to allow the Fletschhörner to appear above the ridge which forms the right bank of the Massa.

THE GORGE OF THE MASSA.

The snowy peaks, rising mysteriously in the far distance above the dark precipices and steep pine-clad slopes of the ravine, give a

character of solemnity to the scene, which greatly enhances the effect of its savage native grandeur.

The greatest of Swiss glaciers has no terminal cave corresponding to it in grandeur of size or regularity of shape, though the stream which issues from it is of very considerable volume; nor are there any notable moraines round its foot, the quantity of stones carried down by its flow being comparatively small. Thus there is no special temptation to linger below the glacier, since the most picturesque spot, some little way above, is also the most rich in interesting details—in glacier pools of wondrous beauty, in dirt-cones of every shape and size, and in surface streams wearing deep channels into the mass of ice. One stream we found imitating its greater kin, plunging into a hole in the ice and making its way underground for some twenty yards, and then once more emerging into daylight. The judicious application of an axe enlarged the orifices of this sub-glacial tunnel a little, so that we could look through it, and feast our eyes on the blue light which pervaded it.

The most remarkable feature of the lower regions of the Great Aletsch glacier is without doubt the texture of the ice, which from the vast mass and long course of the glacier has been exposed to an exceptionally large amount of pressure, until it has become perfectly solid, and acquired that blue colour which Professor Tyndall has shown to be the natural hue of pure ice. This is best seen at the side of the glacier, where the motion has lifted forward masses of ice away from their previous contact with the bank, and thus exposed to view their under surfaces. The depth and richness of the colour with which this ice shone is beyond description; in some places it was an intense sea-green, in others pure blue, but most frequently it was like one entire amethyst; in all cases the colour was either blue or some compound of it.

Crossing the glacier at the accustomed place will scarcely enable one to appreciate even the upper end of the gorge of the Massa, but a descent of very few minutes out of the usual line will lead to the spot before mentioned, whence also the view upwards gains much, by the increased effect with which the jagged crest of rocks, forming the corner between the Great and Ober Aletsch glaciers, stands out against the sky. On the whole the wisest course for any one coming to the Bell Alp across the glacier, who can spare two additional hours, is to descend by the ice into the gorge, and emerging from it at Blatten to ascend thence to the Bell Alp; the path from Blatten is rather less steep, and not very much longer than that which leads up to the inn from the level of the glacier.

A very large proportion of visitors to the Bell Alp either come from the Æggischhorn, or having ascended by the toilsome path from Brieg pass on thither. Those however who may desire a direct communication between the Bell Alp and the upper end of the Rhone valley, will probably find a new and convenient path made before the summer of 1866 arrives. This route, which we were casually led to explore, well deserves attention both for its merits as a means of communication and for its intrinsic beauty. Two of us, having tarried behind the rest of the party for a mountaineering project which was accidentally frustrated, found ourselves late one afternoon driving down the upper Valais with Almer, bound for the Bell Alp. A lively recollection of the roasting we had endured in walking up from Brieg a few weeks before did not inspire us with any ardent desire to repeat the operation; and our purpose was to halt at Viesch, close to the foot of the Æggischhorn, and make our way next morning up into the path leading thence to our destination. Christian proposed going on a mile further to Lax, whence we might possibly find some shorter cut, since he knew that from Viesch we must ascend nearly

to the Æggischhorn hotel before reaching the path we wanted; and very fortunately we accepted the suggestion.

The inn at Lax is almost unknown to English travellers, who rarely have occasion to stop so near the Æggischhorn, especially below it on the main road of the Valais; and both the ways of the house and the charges are delightfully primitive. We were nearly poisoned by a muddy liquid which the people fondly believed to be coffee, but otherwise fared extremely well; and a Valais white wine, about whose name we could only feel certain that it was mis-spelt in the list, without being able to suggest a *varia lectio* even probably accurate, was so good that Christian next morning carried off a bottle on his own private account, which he produced in triumph at a hot and thirsty crisis of our walk.

On hearing that we wished to go to the Bell Alp, the landlord volunteered to accompany us part of the way himself, and show us the direct path, which he said had only been traversed once by travellers; and a very pleasant fellow he proved to be. He insisted on carrying our traps for us, chatted away in a manner which showed that he not only knew the country but really appreciated the beauties of the scenery, and could hardly be persuaded, on parting, to accept any remuneration, declaring that he should be amply repaid for his trouble if we would make known the route which he had shewn to us. If he is a man of his word, he will have improved the path during the present spring, so as to render the walking easier in several places, and to open the somewhat blind trail we followed; nor will he omit to take every advantage of the points of view successively presented.

The ascent from Lax lies to a great extent through woods which afford a shade especially grateful on a hot morning, since the general direction is such as to allow the forenoon sun to shine full on the

back. After an hour's somewhat steep ascent the path winds at a level round the head of a densely wooded ravine, which opens upon the Rhone valley a little way below Lax; it then emerges on the open pastures of the Martinsberg Alp, where the great Pennine peaks, previously seen only in glimpses, come into full view. There are more scattered trees on this Alp than are often to be met with in such places; and thus numerous opportunities are afforded for obtaining real pictures set in the sombre pine branches. Whether there is any unusual abundance of the smaller animals, or of birds, in the neighbourhood, our conductor could not say, and we scarcely caught sight of any ourselves; but the number of hawks which hovered over head seemed to indicate plenty of prey about. Occasionally also a huge Alpine eagle would appear, and wheel his solemn circles in the still air: at one moment we counted no less than three in sight together.

From the Martinsberg Alp there was no further trace of a path, but the proper direction was easily maintained, since our route lay over a marked depression, the only one in the bare ridge bounding the Alp to the north and west. In about two hours of leisurely walking from Lax we gained this gap, and looked down on the Betten Alp, through which the ordinary path from the Æggischhorn to the Bell Alp runs, nearly at right angles to the line of advance we had hitherto been pursuing. Taking a diagonal way of our own across the Alp, at its further extremity we struck into the path, which we thence followed to our destination. The distance from Lax to the Bell Alp by this route is rather longer than from the Æggischhorn; the considerable ascent requires at any rate more exertion, but the walk is superior in variety, if not in beauty, and the possibility of substituting it for a descent down the high road to Brieg and the ascent thence to the Bell Alp is no light advantage.

In fact this path enables one to see all that is most beautiful of the walk from the Æggischhorn to the Bell Alp, should it be for any reason inconvenient to visit the former place.

Mountain climbing has only recently become a comparatively common pastime, as may be illustrated by the two facts that Monte Rosa was ascended for the first time so lately as 1855, and that the Alpine Club is only in the ninth year of its existence. Mountain inns have grown up rapidly to meet the requirements of the ever increasing host of invaders of the high Alps, and have entirely metamorphosed the conditions of travel in many localities. The Bell Alp inn is by no means one of the newest of these: a house erected in 1860 may claim a very fair antiquity amid the mushroom growth of similar buildings. But it is only within the last two years that the mountaineering capabilities of the neighbourhood have been at all developed, though there is probably no corner of the Alps which is now more familiar. When Mr. Ball's Alpine Guide was published in 1864, not a single Englishman had ever ascended the Aletschhorn from this, the easiest and shortest side; and the pass out of the head of the Ober Aletsch glacier, now widely known as the Birchgrat, or more correctly Beichgrat, was in the same condition. Now, on the contrary, the Beichgrat is crossed almost as often as the Strahleck, the ascent of the Aletschhorn has become a common expedition, and the Nesthorn has proved equally accessible and not less attractive.

From the Bell Alp to the top of the Beichgrat is an easy walk of less than four hours, and one of the most beautiful that can be found. The whole expanse of the Ober Aletsch glacier is singularly easy to travel on, and the ascent is so gentle, until reaching the foot of a short slope leading up to the pass, that it scarcely seems to matter whether one walks up or down. About two hours distant from the inn, and about halfway to the base of the slope below the Beichgrat,

from the point where the path reaches the edge of the glacier, is a spot rivalling, though on a smaller scale, the meeting-place of all the huge tributaries to the Great Aletsch glacier, appropriately termed the Place de la Concorde of Nature.

ICE-PEAK—OBER ALETSCH GLACIER.

At this point our camera was planted to take the view of the Nesthorn already given at p. 150, and within a few yards was obtained the annexed picture. This represents a beautiful and somewhat singularly shaped pinnacle of ice, in which the dark lines that indicate the veined structure can very plainly be discerned: in the

background appears the ridge which forms the eastern boundary of the Great Aletsch, and the distant range of mountains beyond the Rhone valley. Thus it affords a tolerably clear idea of the view downwards from the central point, except that it does not include the dark and precipitous cliffs which on each side bound the lower portion of the glacier. The photograph opposite p. 57 shows the ridge of the Beichgrat, which limits the view in the opposite direction straight up the glacier; the point at which the passage is made is as nearly as possible in the centre of the picture.

The views straight up and down the glacier are however the least interesting part of the panorama; to right and left, up the openings which form the other arms of the great cross, are disclosed the superb peaks of the Aletschhorn and Nesthorn, each overshadowing a considerable amphitheatre of glacier. There is nothing visible from the rival point on the Great Aletsch glacier which at all equals these in grandeur of form, as none of the chief mountains are thence fully in sight from base to cope. Of the Nesthorn and its surroundings no description is necessary, since the illustration at p. 150 gives a faithful representation of it: but neither words nor picture can convey the impression produced on the mind by the vast height of the peak, towering at least a perpendicular mile overhead. The Aletschhorn is distant more than twice as far as the Nesthorn, which is not a mile and a half off, or little more than its height above the level of the glacier. Thus the thousand feet of advantage which the Aletschhorn enjoys above its opposite neighbour by no means renders it the most imposing, though in beauty of outline it is undeniably superior. The picture already given at p. 141, which was taken from the top of the Sparrenhorn, exhibits the summit of the Aletschhorn, but cannot convey any

idea of its sublimity when the whole height of the mountain is disclosed.

There is probably no other spot within equally easy reach of an hotel, where two such genuinely high-Alpine views can be obtained. The Finsteraarhorn as seen from the Abschwung is superior in grandeur to either, but requires more than twice the walking before it can be enjoyed; and there is no other peak of even second-rate interest included in the view. The whole expanse of the glacier is so smooth and easily traversed, that an excursion to this central point is the ideal walk for ladies, who desire to place themselves for once in the heart of the mountains, and to know what a great peak is like when seen in close proximity, with no foreground to distract the attention from the one chief object. At the same time the Ober Aletsch glacier is very rich in details, and there is a fair chance of catching sight of a chamois on the long wall of crags which forms the right bank. It may not be long before the increase of visitors to the upper region of this glacier drives the chamois to seek other haunts: but at present they are believed to be more numerous around the Aletschhorn than in any other quarter of the Oberland.

If there be no soft snow covering the upper portions of the glacier, it will cost but little fatigue, and only about two hours of time, to extend the promenade as far as the top of the Beichgrat. A totally new idea is thence gained of the Nesthorn, and the huge basin of the Ober Aletsch glacier more fully appreciated. An altogether different world seems also to come into view on the western side of the pass. So steep is the descent that at first sight there appears no way of reaching the bottom of the valley, which lies like a deep trench between our standing-point and the opposite range of mountains. The footing is however good, and the descent easy, unless there be soft snow thickly lying over the rocks, or a thin

sheet of ice remaining when the snow has almost disappeared: and a scramble of less than an hour and a half will usually suffice for reaching the level of the Lötsch Thal, 4,000 feet below, at a point very near the base of the long glacier which fills its head.

This valley is extremely beautiful and diversified in its scenery, but is little known to fame on account of the want of enterprise among its inhabitants. No one seems to have the courage to start an inn, except the curé at Kippel, the chief village; and he only does it in a very half-hearted way, nor can he accommodate more than two or three persons. It is the fault of the people themselves that the night of obscurity which hangs over their valley has not been dispelled by the efforts of a *vates sacer*: though they can scarcely be expected to have arrived at the Moses & Son pitch of civilization, and to entertain a poet of their own, yet they might know that the race is proverbially almost as hard to please as woman in her hours of ease, and that a man must be very thick-skinned indeed to praise a locality where he has been dined upon instead of dining.

If we are leaving the Bell Alp, and moving in the direction of Berne, we shall with great advantage make the descent from the Beichgrat, and halting for the night at the highest chalet in the valley (among the cleanest and most hospitable in the Alps), cross on the following day by the easy pass of the Petersgrat, or the difficult one of the Wetterlücke, to the head of the Lauterbrunnen valley. If our destination be the Gemmi, we shall stroll down the valley to Kippel, and make our way thence either to Kandersteg on the northern side of the Gemmi, or to Leukerbad at its southern foot over the beautiful Torrenthorn. If on the other hand we are not yet tired of the Bell Alp, we may linger until the sun is perceptibly verging towards the west, and still be able to return in good time for the

stewed whortleberries and cream which almost invariably adorn the *table d'hote*.

The great defect of the Bell Alp establishment is the want of any guides acquainted with the neighbouring mountains, or even accustomed to glaciers in general. There is a short and sturdy man, named Peter, surname unknown (unless the equivocal soubriquet of *Le Diable de la Bell Alp* be regarded as equivalent to one), who carried about our camera with great equanimity, and was generally civil and obliging: but he did not even know the way to the Beichgrat, much less up the Aletschhorn, and there is literally no one else. However, it may be expected that with the demand a sufficient supply of good guides will spring up: and meanwhile it gives a sensation of novelty to find a guideless place within the frequented regions of Switzerland.

CHAPTER XI.

THE PLEASURES AND DANGERS OF THE ALPS.

Go to the east or the west, as the sun and the stars direct thee,
Go with the girdle of man, go and encompass the earth.
Not for the gain of the gold, for the getting, the hoarding, the having—
But for the joy of the deed, but for the duty to do.
Go; say not in thine heart, And what then were it accomplished,
Were the wild impulse allayed, what were the use or the good!
Go; when the instinct is stilled, and when the deed is accomplished,
What thou hast done and shalt do, shall be declared to thee then.
Go with the sun and the stars, and yet evermore in thy spirit
Say to thyself; It is good, yet is there better than it

A. H. Clough.

THE traveller who delivers himself over, body and mind, to external guidance, whether of a printed book or of a native attendant, who goes precisely where he is led and admires just what his companion tells him is beautiful or remarkable, is happily becoming extinct. The fabled *milord*, who on being asked his opinion of the chief object of his tour turned to his servant with "John, what did I think of Venice?" is a possible being no longer. The mere fact of having travelled, without any question of having derived benefit from it, is not now a social distinction; for every one

travels, and has at the least a vague and superficial acquaintance with places far beyond his own immediate sphere. Modern education also, both in its actual extension and in its change of direction, tends to produce the same result: there are more linguists, more botanists and geologists, more amateurs of painting and architecture; and thus the general capacity of judging for oneself, of making an intelligent use of travel, is largely increased.

The class of people who formerly saw with their neighbours' eyes now fall into an error on the opposite side, and tend to disbelieve whatever they find written in books. Either they go about disparaging everything, despising a valley rich in streams and forests because no snow peaks overhang it, and a wide view of the high Alps because it includes no corn-fields: or they imagine that they can see all that is worth seeing much quicker than the rest of the world. A youth of the latter species was once heard, on board a steamer on the lake of Lucerne, loud in his praise of the view from the Rigi: "What are you going to do next?" asked some one; "shall you go up Pilatus?" "No, thank you," was the answer; "all low mountains are alike, and all high ones are too much trouble. I've been up one, and that's enough for me." Even did the Rigi panorama include all types of scenery more completely than it does, a man must be possessed of marvellous genius, or enormous conceit, to believe that he can comprehend at once all the manifold beauties of the Alps.

For people who are below the patient study of nature, whether they deem themselves above it or not, it is useless to write: but for those who, while desiring to use their own eyes and admire with their own judgment, may wish to know what to look for in each particular locality, it may be useful to give a brief account of the characteristic peculiarities of some of the main glaciers of the Oberland. Thus a traveller, unable to visit all, but anxious to see as many diverse types

as he can conveniently combine, or specially interested in a particular matter, may learn at least what he may not expect to find on any given glacier; for the objects of interest are so numerous and varied that to try and state dogmatically what is worth seeing on each glacier would be as presumptuous as it is impossible.

The Unter Grindelwald glacier combines on the whole the greatest number of special advantages; its termination is close to the village, and its whole surface is accessible from numerous points, as already related in Chapter V. Both branches descend to the Eismeer in magnificent ice-falls, and the mountains overshadowing them are signally grand and sublime. Part of the surface of the Eismeer is smooth and level, and part broken by innumerable crevasses, whose singular formation has been before referred to. The *specialité* of the Eismeer is however its fertility in moulins, wherein it certainly exceeds any other glacier in the Oberland. One of those moulins, or strictly speaking the place where successive moulins are formed, has acquired a fatal celebrity from the death of a protestant pastor named Mouron, who was killed in 1821 by falling into it. The veined structure also is developed to an unusual extent upon the Strahleck side; and there are very few places where one may approach more closely to towering ice-pinnacles, remaining all the while in perfect safety, than in the lower part of this glacier above the final fall. Nor does any glacier more fully illustrate the manner in which massive moraines are sometimes swallowed up: the huge ridges which seam the surface of the Eismeer are scarcely visible down the course of the fall below it, but re-appear to a certain extent on the smoother portion beyond. On reaching the termination of the glacier, however, we find its whole lower extremity and the ground in front of it thickly covered with moraine, which having dived, so to speak, into the ice-stream where it emerges from the Eismeer, has here returned into daylight.

The Ober Grindelwald glacier presents in most respects a remarkable contrast to its near neighbour and namesake. It has scarcely a trace of moraine on its surface, since it descends from a single enormous snow-field: it has no wide plain of ice above its final descent, though in the alternation of steep fall and gentle incline it nearly resembles the Unter glacier: and it flows through a channel with sides so high and precipitous that it is all but impossible to reach the ice, and quite useless to do so for any purpose except the exploration of its surface, since the track of mountain ascents lies high along its right bank. Though not a glacier to be examined in detail, except at its termination, where the deficiency of moraine exposes ice clearer and more beautiful than that of its neighbour, the Ober Grindelwald glacier possesses the grandest ice-fall in the Alps, the sight of which would amply repay an ascent to the point where it comes fairly into view, even if the surrounding scenery were not in the highest degree wild and stern. There is also considerable interest in observing how completely the surface below this tremendous fall is smoothed by the pressure, so that, were the bounding walls less steep, allowing of easy access to the ice, one might walk without hindrance in any direction over a considerable space.

Both glaciers share the immense advantage, for those whom necessity or choice induces to consult their ease, of proximity to a village which is on the whole the most desirable head quarters in Switzerland. Grindelwald combines in itself almost every possible excellence as a mountain station: it possesses very good accommodation, is accessible by a good road, and is within such easy reach of Thun and the railway that a traveller may leave London one morning and sup in Grindelwald the next evening. It is the centre from which diverge numerous mountain routes, suited to all capacities and of unsurpassed beauty; and in the scenery visible from the village itself it

is excelled by Courmayeur alone. Moreover the Grindelwald guides are, as a body, the most skilful and trustworthy set in the Alps: and there is no absurd system of rotation, such as exists at Chamouni, compelling the employment of the particular guide whose turn comes next. They are usually stronger than the Chamouni men, and more willing to do their utmost, though the fact of their speaking German instead of French is a disadvantage with English people in general.

The Aar glacier was the scene of the persevering labours of Hugi, Agassiz, and other early investigators of glacier theory; and certainly they could hardly have chosen one better suited for their purpose. Its long narrow channel and equable flow render the similarity to a river especially obvious, while there is no glacier in the Alps where the moraines are so large, so continuously perfect, and so clearly referable to their several sources. For the same reason it abounds in glacier tables, and in every phenomenon resulting from the fall of rocks and débris on to the ice. It possesses a very great number of deep water holes, the motion being so steady and the bed so even that crevasses are seldom formed to destroy them; and the numerous surface streams in like manner, being allowed to run a long course, excavate remarkably deep and intricate channels. The severe mutual compression of the several branches developes the veined structure almost everywhere, and this is in many parts rendered unusually conspicuous through the amount of loose dirt washed and blown over the surface of the ice, which fills up the minute grooves caused by the blue veins and the looser ice between them melting unequally. Down its entire length the Aar glacier is lined, especially on its southern side, with small secondary glaciers, some of which descend into the main stream, and some terminate above it, not unfrequently forming *glaciers remaniés* by their fall.

Totally different in every respect from the great Aar glacier is its

near neighbour, the comparatively insignificant ice-stream which gives birth to the Rhone. Descending from a wide and level snow-field in an ice-fall both steep and narrow, the Rhone glacier no sooner reaches the foot of the fall than it spreads out over a wide bed, as if rejoicing in its liberty; and coming to a speedy termination, it affords the best possible instance of the manner in which a glacier will flow when least compressed in a lateral direction. At the same time the shape of the valley is such that it flows not in a continuation of the line of the ice-fall, but at a considerable angle to it, whereby is perfected the fan-like arrangement of the crevasses before mentioned, and the poetical comparison of Longfellow * rendered most appropriate. "Its "shape is that of a glove, lying with the palm downwards, and the "fingers crooked and close together. It is a gauntlet of ice, which, "centuries ago, Winter, the king of these mountains, threw down in "defiance to the Sun; and year by year the Sun strives in vain to "lift it from the ground on the point of his glittering spear."

The Great Aletsch glacier is not only actually the largest in the Alps, but also the grandest and most impressive. Sweeping down in one majestic curve, unbroken by a single ice-fall, it has a character of deliberate yet irresistible force, which no obstacle, however strong, will avail to turn aside from its settled course. Its dimensions are truly colossal: measured from the foot of the Jungfrau Joch, against which abuts the upper end of the huge snow-field out of which the glacier directly issues, to the termination of the glacier in the magnificent gorge of the Massa, its length is fifteen miles, and the breadth, nowhere less than 1,200 yards, in some parts reaches nearly double that amount. The depth of the ice can hardly be guessed at; the lateral valley containing the Märjelen See, though of no small width and at

* "Hyperion," Book III. ch. 2.

least a hundred feet lower than the surface of the glacier, has not the slightest effect in deflecting its course, so enormously deep and solid is the mass of ice flowing down the channel of the Great Aletsch. The stream of the Massa, formed by the meltings of this single glacier, is double the size of the Rhone at their point of junction, although the latter conveys the accumulated waters of the whole upper Valais.

The Great Aletsch is rather to be seen as a whole from the summit of the Æggischhorn, or similar elevations, than to be explored in detail. Its moraines, though in a comprehensive view they can be clearly traced, running downwards as evenly as lines of rail, are in truth small and uninteresting, while the vast extent of the surface, and its broken nature, render exploration laborious and tracing the veined structure nearly impossible. The inclination of the glacier is nowhere great, the fall being only about 6,000 feet in a course of fifteen miles ; but it increases regularly throughout, so that there is a continuous convex curve of the surface from the Jungfrau Joch to the gorge of the Massa. Hence the whole upper surface, being exposed to perpetually recurring strains, is broken by crevasses nowhere gigantic, but sufficiently wide and deep to impede locomotion. For the same reason there are scarcely any surface streams, with their attendant moulins: in very few places can a space be found of sufficient length to permit the accumulation of a rill, but all the water formed by the melting ice makes its way at once into the depths.

The Ober Aletsch glacier, the last tributary which falls into its gigantic namesake, is of a very different character. Until reaching the final fall over which it topples into the main valley, its flow is even more regular in appearance, and its moraines more perfect and continuous than on the Great Aletsch : and there are consequently many more glacier curiosities. It is in fact a cleaner copy of the Aar glacier on a much smaller scale, but with the important addition of a

terminal ice-fall of the most regular construction: while, through the comparative scarcity of crevasses, it is easily traversed in all directions. Its characteristic feature is the almost level expanse and vast size in proportion to that of the glacier, of the upper basin, or rather pair of basins, out of which issues the glacier properly so called: these features have been already dwelt on sufficiently in a previous chapter.

The modes in which glaciers terminate are almost as various as their courses, and would be highly interesting in themselves even if the ice at the foot of a glacier were not necessarily in a condition of the greatest density, and consequently of the highest beauty. Some end like the Rhone glacier, in a widely spread and comparatively thin cake of ice, cloven by crevasses converging towards the centre, and nowhere very closely compressed. Others terminate in a forlorn manner, without any apparent reason, half way down a steep slope, the ice being dislocated as is usual upon a fall, and in that state finally melting away: to this melancholy condition the two Grindelwald glaciers will be reduced, if their present rate of diminution continues much longer. Others, like the Aar glacier, having been heavily laden with moraines during their course, have their extremity covered entirely with stones, and lose all outward appearance of a glacier. Some again are forced into a narrow gorge, and have their substance compressed to a density worthy of an iceberg: of this kind the Great Aletsch glacier, as depicted on p. 171, is a good instance. Sometimes, but by no means universally, there is a regularly defined cavern at the foot of a glacier, caused by the water which issues thence in a collected stream, draining nearly the whole under surface of the glacier, and forming the source of the resulting river. The terminal cave of the Unter Grindelwald glacier, represented on our last page, is usually as perfectly formed as it there seems to be: but it not

infrequently happens that the whole arch of ice gives way, and falls in with a crash, blocking the flow of the waters with huge masses of ice, and obliterating for the time all the beauty of the cavern.

By visiting the six glaciers of which sketches have been given, any one may obtain ocular acquaintance with all the various types of glacier, and with the phenomena of their formation and surfaces. Far be it from us, however, to imply that other glaciers of the Alps, or even of the Oberland, are comparatively of little interest. The glacier of Rosenlaui has acquired great and deserved celebrity for the purity of its ice and for the beauty of its terminal caverns: the Oberaar is of the straightest and simplest possible form: that of Viesch, the most sinuous, is further remarkable for its small size in proportion to the vast snow-fields out of which it flows: the Guggi and Eiger glaciers, on the northern face of the Oberland, are among the steepest up which a passage has ever been made, and the most wonderful in their complicated crevasses: while the huge Gauli glacier would deserve to rank among the foremost were it but accessible by any easier means than by six hours' walk up a steep valley from Meyringen. All these, and many more, will amply repay the explorer for his trouble; but if a choice is necessary and free, it will better be made from among the glaciers of the first importance.

The Oberland is perhaps exceptionally favoured in the regularity of its glaciers, and the consequent ease with which they can be visited: and enough has probably been said already to show that these glaciers may easily be explored by any person capable of walking a moderate distance. Still there are many things which it requires skill to discover, and some familiarity with ice-walking to reach: and the grandest scenery is of course to be found only by climbing for it. Mr. Ruskin seems to think that the beauty of the Alps is best seen

from below, where all persons can enjoy it alike, whatever their physical powers. This is undoubtedly true in a certain sense: picturesque views, in the proper sense of that much abused adjective, require the combination of other elements with the bare dark rocks and the gleaming white of the snow. But many scenes are grand and impressive in the highest degree without being picturesque, that is to say without being suitable subjects for pictures; from the very fact of being unlike what men in general would recognize as a natural picture, they have a stronger effect on the imagination of the beholder, and fix themselves on the memory more indelibly.

The beauty of the prospect to be enjoyed from the high peaks of the Alps is one which appeals rather to the feelings than to the artistic perceptions, and is none the less attractive because it hardly admits of translation into words. Perhaps the impression of it can scarcely be dissevered entirely in the mind from consciousness of the effort necessary before it can be enjoyed, though it may fairly be reckoned as independent of the specific difficulty of any particular peak, as compared with others. It is not merely the ardent and enterprising, glowing with a desire to see with the bodily eyes those glories which the imagination paints in such bright colours, to whom the feeling is natural:—

> Methinks what bliss it were to scale
> Yon peak that seems as soft as Hope afar,
> Crowned with the sunrise, or the morning star.

The veterans of the Alps, who have seen dozens of such views, and who enjoy from long familiarity the difficulties and dangers to which the untried beginner, however bold and determined, cannot look

forward without some slight anxiety, have a delight in the scenery not less keen, and more appreciative, than one who finds himself for the first time on a lofty summit.

For such sights as are to be seen upon, and during the ascent and descent of, any high mountain or pass, it would be worth while to incur some trouble even if there were no pleasure in the actual going. Practical experience teaches us that we cannot expect to obtain a good article without paying a fair price for it, and this holds good whether the payment is to be made in coin of the realm or in our own labour. Setting aside the money cost of Alpine travelling, which is after all less upon the average than that of most other journeys, we must expend a considerable amount of personal exertion, if we would explore the choicest secrets of nature. To the majority of Englishmen active exercise, of whatever kind, is more commonly delightful than irksome; and thus the expenditure more than repays itself, leaving the enjoyment derived from the scenery as pure profit on the transaction. And it is only those who thus enjoy bodily activity who are ever likely to be attracted by the Alps: people studious mainly of their ease will not travel away from their comforts and luxuries. Nor ought it to be forgotten that Alpine walking and climbing exact perseverance and sustained effort to a degree considerably exceeding the requirements of any other athletic sport: there is nothing in home pursuits, not even a long day's tramp with a gun on one's shoulder without ever seeing a head of game, which taxes the patience so heavily as plodding up a steep and soft snow-slope which seems to come to no visible termination.

It is not to be denied that a certain amount of danger, as well as of severe exertion, must be encountered in exploring the wonders of the high Alps. Nor is this really to be regretted, since nothing braces

a man's nerves, and prepares every muscle for the maximum of effort, like the consciousness that his life is in his own keeping, provided always that he has room for the full use of his powers, and that there is nothing to impede their energy. The dangers to which climbers are exposed in the Alps are probably not really understood by any one who has never experienced them ; and a few words on their nature, and the mode in which they should be met, may not be without their interest even to those who have a practical knowledge of the matter, and are most concerned that others should understand it also.

There are in truth two senses in which the word danger is used, and much confusion, both of thought and language, arises from not accurately discriminating between them. This distinction may be traced through every description of danger, but is especially conspicuous in that class to which our attention is now directed. A place is properly said to be dangerous, where something beyond the control of man is likely to happen, which will cause harm to persons on the spot at the time when it occurs; for instance a place among the Alps is truly dangerous, on which an avalanche or a fall of stones may at any moment descend—a thing which no skill or strength can guard against, or prevent from inflicting injury. A risk of this kind is rarely encountered, because the spots so exposed are few in number, and clearly seen to be dangerous. If the risk be slight, it will generally be braved without hesitation, care being taken to remain exposed to it for as short a time as possible; if serious, it ought to entail the abandonment of the expedition, if no way of circumventing the dangerous point can be discovered ; the only practical difficulty is where to draw the line, and this must necessarily be left to the judgment of the parties concerned on each particular occasion.

A place is also, and improperly, called dangerous, where an accident

resulting from causes within human control will probably involve very serious consequences—for instance, a slope of ice on which a party is moving by means of cut steps, and where the fall of any one may carry the others to destruction. This species of danger not only must be encountered more or less in all mountain climbing, but is also exactly what furnishes the most valuable stimulus to the bodily and mental energies. No one has a right to venture among the high Alps unless he can trust himself to keep his balance, to look unmoved down a crevasse or a precipice, and to tread securely in an ice-step. It is proverbially impossible to learn to swim without going into the water, and perfect self-confidence can only be gained by experience. But no man ought to go where a slip will peril the lives of himself and others, until he has a reasonable assurance, founded on previous practice in less exposed places, that he at least will not be the one to slip.

Between these two clearly marked sorts of danger lies a "debateable land," which possesses in part the distinguishing features of the one, and yet must be judged of by the principles applicable to the other. There are places where footing and hand-hold are so precarious that the most skilful may easily lose their hold or their balance, where disaster, though caused by human failure, could not yet be fairly charged to want of skill. In each individual case the question arises, whether such risk may rightly be braved, and the answer must be the same as if the danger were entirely beyond human control. The nearer however that risks *primâ facie* avoidable approach to this condition, the more sedulous ought to be the care taken; though in truth the lack of due precautions is never excusable, seeing how grievous a loss may be occasioned, in their absence, by momentary carelessness.

The artificial precautions requisite to guard against Alpine dangers

consist chiefly in the continual employment and proper application of the rope; but there are also safeguards of great value, not only against the actual perils of the mountains, but against any injury to health through climbing. These may all perhaps be summed up in the single quality of prudence, but are developments of that virtue in different directions. That the novice ought not to attempt difficult climbing has already been urged, on the ground of the risk thereby entailed on the party; a lower but equally valid motive for abstaining is to be found in the great probability that his inexperience may cause such delay as to frustrate the object of the expedition. Similarly it is inexcusable rashness to persevere when a competent guide thinks it dangerous to proceed, on account either of the intrinsic danger of the place, or of the state of the weather.

A third and most important exercise of prudence consists in not doing too much. One man's meat is too often another man's poison: the amount of exertion which is healthily sufficient for one may be far beyond the strength and endurance of another. Though in the pure mountain air it is comparatively easy to do much more than at home, yet there is a limit to the effects produced by even that most invigorating of tonics; and time must further be allowed for it to do its work. The man who travels straight out from England, and sets himself immediately to climb Mont Blanc or the Wetterhorn, will in all probability knock himself up for a week, whereas if he had trained himself by three or four days of less arduous walking, he might easily have accomplished his purpose. Mountain sickness is a thing frequently talked of, though but seldom experienced: some few people are unquestionably affected by the rarity of the air; but the majority of those who, in the early days of Alpine travel, brought back from the mountains such vivid reminiscences of their sufferings, were simply paying the penalty of

attempting severe and prolonged exertion without any previous preparation.

With such precautions as these, mountain-climbing is, if not absolutely free from danger, as safe a pastime as any other of the sports which are the pride and delight of the English nation. And if it be reckoned among field-sports, as a pursuit of the same character, it may fairly claim a prominent place among them, if not the very foremost rank. Mountaineering offers, to those able and willing to profit by the opportunity, abundant means of gathering knowledge in various branches of science. Very few can hope to discover among the Alps anything universally valuable as actually new, or as illustrating old truths in a novel manner; yet all can pick up stores of knowledge which will be valuable to themselves, and will materially aid them to appreciate the varied wonders of creation and the infinite wisdom of the Creator. Moreover mountain-climbing inflicts no suffering on any living creatures, the actual, though scarcely perceived, end and purpose of shooting, hunting, fishing: and though this is no valid reason for condemning those pursuits absolutely, yet it creates a drawback to them in some minds, from which mountaineering is exempt.

The impulse which urges men to the high Alps is however somewhat different from that which leads them to take up ordinary field-sports; or rather the motive which underlies all alike more visibly incites to this pursuit. It is in part ambition translated into physical action, recking little of the obstacles which bar access to any desired end:—

> From shelf to shelf ambition clambers up
> To reach the naked'st pinnacle of all.

The mountaineer is a more perfect type of the ambitious

man than even the fox-hunter, laudably zealous to be in at the death; and he has the further advantage that his end, when attained, is worth having.

The means however, rather than the end, are the intrinsically valuable portion of all athletic exercise. All alike are desirable, not for the object sought to be attained, but for the discipline of mind and body in the pursuit. No one would care for a fox's brush if it were not the trophy of a laborious chase, and of a triumph over his competitors for the same prize: it is not the keenest sportsmen who enjoy the slaughter of a battue. And though there would be some real pleasure in standing on a mountain-top, if one could reach it by five minutes' walking, yet the sense of enjoyment would be by no means as keen as when the same thing is attained by a long and laborious ascent.

The climbing spirit, like the love of all kindred pursuits, is essentially a form of that restless energy, that love of action for its own sake, of exploring the earth and subduing it, which has made England the great colonizer of the world, and has led individual Englishmen to penetrate the wildest recesses of every continent. It is the vent found, by men engaged in peaceable stay-at-home occupations, for a love of adventure which can hardly be indulged in any other way; and if their zeal renders them occasionally immoderate in their praise of the pursuit, and imprudent in urging upon others its claims to favour, they are not louder in their appeals for public appreciation than enthusiasts in other sports. To all alike some little obtrusion of themselves on unsympathising hearers may be forgiven, in consideration of their fostering, each in their special way, a spirit to which England owes much of her greatness.

It was not without reason that our great poet borrowed from the

mountaineer's pursuit his noble simile for the steady performance and final reward of Duty:—

> He that with toil of heart and knees and hands
> Through the long gorge to the far light has won
> His path upward, and prevailed,
> Shall find the toppling crags of Duty scaled
> Are close upon the shining table lands
> To which our God Himself is moon and sun.

Patience, dogged perseverance, fixed determination to go through with a work once undertaken, are qualities for the exercise of which the climber has frequent occasion, and thus body and mind alike receive a training which is not without its value in more serious matters.

In proportion as the labour has been long and severe, so will the enjoyment of the prize be intense. Some find pleasure in being able afterwards to claim the credit of having ascended this or that mountain, a propensity by no means confined to Alpine climbers, nor more prominent in them than in devotees of boating or fox-hunting. And contemptible as this vanity is when unduly exhibited, there is a legitimate side to it, a lawful pride in being known to have performed a difficult feat, perhaps never before accomplished. But the pleasure after all consists mainly in the "joy of the deed," in the sense of having fairly conquered the difficulties in the way, and having at length reached the goal chosen beforehand as the end and object to be aimed at. This satisfaction is entirely independent of anything to be seen on the top or during the ascent, and would almost suffice to justify the mountaineer in being ready to climb, even when the summits are "enwrapped in mist from base to cope," unless prudence interfered.

Thus Alpine climbing possesses a spice of almost every form of pleasure and profit. It brings the body into the best and healthiest condition, and affords that instinctive and half-conscious delight which every man—it may almost be said every animal—experiences in using his muscles vigorously and successfully. It unfolds to the eye an ever new series of beauties, alternately grand and soft, exquisite in their detail or sublime in their sternness. It feeds the intellect and the imagination with the sight of the mightiest forces of nature in operation, and of the vast results which they have achieved. And when we add to these physical and mental pleasures the moral satisfaction which is derived from dangers braved and difficulties overcome, we may fairly claim to place mountaineering as not only the first of athletic pursuits, but as almost the greatest of those pleasures which are self-regarding. Those which spring from benevolence and the affections are entirely different in kind, and enter into no comparison with the pleasures which in no way arise from sympathy with others; and though we acknowledge the infinite superiority of the unselfish order of pleasures, the world is too full of materials for the lower kind to permit us to think lightly of one which combines in itself almost every variety of self-regarding enjoyment.

CHAPTER XII.

THE ŒSCHINEN SEE AND STEINBERG ALP.

A land of streams! some, like a downward smoke,
Slow-dropping veils of thinnest lawn, did go;
And some through wavering lights and shadows broke,
Rolling a slumberous sheet of foam below.
They saw the gleaming river seaward flow
From the inner land: far off, three mountain tops,
Three silent pinnacles of aged snow,
Stood sunset-flushed: and, dew'd with showery drops,
Up-clomb the shadowy pine above the woven copse.—TENNYSON.

IT is remarkable, considering the vast quantity of ice and snow that covers the high Alps, to observe how little conspicuous running water is in the majority of extensive views. The slender brooks coming from the terminal caves of the glaciers are occasionally visible, and from some few high peaks may be descried the long reach of some larger stream, not unworthy the name of river; but on the whole water plays a very subordinate part in the scene, as compared with its importance in landscapes of humbler pretensions. This arises in a great measure from the

depth of the valleys, rendering it difficult to see down into them from surrounding heights, and from the manner in which many streams cut channels for themselves below the average level of the valleys; but independently of this there is an undoubted deficiency of water collected in any considerable volume.

The lakes of Switzerland and North Italy are, it is true, unrivalled in beauty, and vary infinitely in their character, from the stern grandeur of Lucerne and Wallenstadt, to the smiling loveliness of Maggiore. But from very few mountains that themselves belong, or approach nearly, to the regions of everlasting snow, can more than a distant glimpse of any of the great lakes be obtained, while nearly all the fine water-falls are shrouded in valleys not otherwise distinguished for beauty.

Those who appreciate water most highly, as an essential element of the beautiful in scenery, will find no corner of the Alps more to their taste than the north-western portion of the Oberland. The valley of Lauterbrunnen derives its very name from the number of its streams and water-falls, while in the neighbourhood of Kandersteg, separated from Lauterbrunnen by a day's journey over one of the easiest and grandest of glacier passes, is to be found a gem of finer water, to use an excusable pun, than any other in Switzerland. Within an hour's walk of the road, in a lateral valley up which is the alternative route to Lauterbrunnen, less interesting and more laborious than the Tschingel Pass, lies the Œschinen See, a small lake about a mile long and a thousand yards wide, bordered round more than half its circumference by pine woods, and bounded on the other side by the sheer precipices of the Blümlis Alp.

The sight of this lovely sheet of water comes on the traveller as a surprise. After walking for nearly an hour up the boulder-strewn course of the stream which drains the lake, and through thickets of

dwarf trees, he emerges upon an open space of undulating ground, carpeted with fresh turf, and intersected by many rivulets: and not till the highest swell is surmounted does he catch a glimpse of the Œschinen See, now within a few yards of his feet. The peaceful waters, sheltered on every side by thickly clustering forest or gigantic precipice, are seldom ruffled by the wind: and the mighty forms of the Blümlis Alp and her sister peaks are reflected so clearly that we seem to see down, as in a vision, to the depths where their foundations are fixed, and to discern that they share the firmly-rooted stability of Virgil's oak,

> Quæ, quantum vertice ad auras
> Ætherias, tantum radice in Tartara tendit.

The impression of stern and fixed repose thence derived is not impaired by the contemplation of the peaks themselves. For a great distance above the level of the lake the face of the mountain consists of a series of bare grey precipices, broken by narrow and shelving ledges, and nowhere allowing snow to cling to their weather-beaten surface. The summits recede considerably from the upper edge of these precipices, and the glaciers which clothe their sides scarcely anywhere descend so far as the brow. Thus no ice-avalanches, like those which thunder from the cliffs of the Jungfrau and Wetterhorn, disturb the calm stillness of the Œschinen See. Instead of the occasional torrent of icy fragments, and the roar which heralds its descent, the waters of the melting glaciers are poured over in countless tiny falls, and re-uniting below into new rills, are precipitated over another and yet another precipice. The whole face of the rocky wall is covered with a network of intersecting lines, growing and dwindling

THE ŒSCHINEN SEE AND BLÜMLIS ALP.

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momentarily in thickness, and forming a living pattern of silver on the stern grey cliffs.

None of our party had ever fairly seen the Œschinen See, though several members of it had visited the place in weather more or less unfavourable; and when the time for breaking up drew so near that we could map out our final movements exactly, it was unanimously agreed that the banks of this sequestered lake, the most picturesque spot to which our wanderings led us, should witness our last Alpine picnic. The established regulations were once more carried out: a photographic detachment was ready to begin work with the earliest available daylight, and the main body arrived on the field at a later hour in charge of the commissariat. Unlike the glaciers on which so many similar days had been spent, the shore of the Œschinen See afforded us plenty of cool shade: and, late as it was in the season, not a few strawberries still remained to give an epicurean flavour to our rough meal. A dogmatic gentleman was heard at Thun to explain the abundance of strawberries there by asserting that they grew on all the high mountains and most of the glaciers, but he omitted to name the specific glaciers; doubtless we were unfortunate in our selection, for this was the first occasion on which our picnic took place away from glacier or tolerably high mountain, and the first also that ever strawberries graced the feast. Mr. Wills has extolled the neighbourhood of the Œschinen See for the abundance and variety of its wild fruits; and though too late for most of them, we found quite enough to reconcile us, with the further comforts of shade, and luxurious bathing within a quarter of a mile, to not having ice under foot. Nor was it until the sun had sunk finally behind the range of the Doldenhorn that we broke up our encampment, and returned reluctantly to Kandersteg.

The next day our party split into fragments, like a bursting shell, and scattered in every direction, one element of it going off to Geneva, another to Paris, and a third back to England. There was still a little work to be done in the neighbourhood of Lauterbrunnen and Grindelwald, and the plan decided on was that the two remaining ladies should wait quietly at Thun until it was finished, while E—— and G—— took the camera over the Tschingel Pass to the head of the Lauterbrunnen valley. At the proper hour in the morning, or rather in the night, G—— was duly called, and on his way down to breakfast knocked at his intended companion's door, as a friendly hint that the sun waits for no man. A sleepy voice from inside was heard to growl out: "I was up till one varnishing plates, and haven't done yet; so I can't come with you." There being no answer to this argument, and yet no sort of reason why G—— should give up his last pass to go by the high road, it was hastily arranged that E—— should drive round in the course of the day to Lauterbrunnen, there to meet the glacier party.

Soon after five o'clock, just as the first faint tokens of dawn were beginning to appear in the sky, G—— and the two Almers quitted the hotel at Kandersteg, accompanied by a small dog, a rather unusual comrade for a glacier expedition. A few days before, most of our party, assembled on the summit of the Torrenthorn, were expecting the arrival of two of its members, who had been taking a line of their own under the guidance of Christian Almer, and had agreed to rejoin us on the Torrenthorn from the direction of Kippel. We knew that there were several possible routes, and that not even Christian had any personal knowledge of the geography; and speculation was rife as to the precise direction from which they would make their appearance. Presently four men and a dog were descried at the

upper corner of the Maing glacier, three of whom were identified, but the fourth, as well as the dog, remained a profound mystery. To reach the actual rocks of the Torrenthorn from the glacier some steps up a steep ice-slope were necessary, and the dog excited the admiration of all spectators by the unconcerned way in which he trotted up them.

On arriving at the summit Christian explained that the dog had struck his fancy as they were passing a hamlet on their way up from Kippel, and that he had purchased it for ten francs. The poor beast was terribly frightened by its introduction to so many strangers, but in the course of a day or two became very friendly, and accompanied us over the Gemmi and up to the Œschinen See with great good will. Christian was bent on taking it home with him, and thought that a dog which had borne its initiation so creditably on the Maing glacier, would not fail to cross the Tschingel successfully. His other waif from the Lötschen Thal, a sturdy little man belonging to Kandersteg named Franz Ogi, had been carrying the camera ever since, and was to have continued that service on this day also, but for E——'s change of plan. Doubtless he found it a lighter day's work to drive round to Lauterbrunnen than to carry a heavy burden over a glacier pass.

The entrance into the Gasteren Thal from Kandersteg has been most skilfully masked by the hand of Nature, as if her choicest treasures of scenery were concealed within. Even in broad daylight it is not easy to discern from a little distance the position of the narrow winding cleft, through which the river Kander comes tumbling down in a series of beautiful rapids; for a promontory of rock entirely hides every trace of the stream. When the faint twilight of early dawn makes it impossible to distinguish distances, one seems when following the path from the hotel to be walking straight towards a dead wall.

In a few minutes the delusion vanishes: we turn a sharp corner into the defile of the Kander, and zigzag up a steep path, with the roar of the torrent thundering in our ears.

Like many other Alpine valleys, the Gasteren Thal, up which lies the way to the Tschingel Pass, has an outlet entirely disproportioned to its real size. Although the gorge which unites it with the main valley is scarcely wider than is necessary to admit the passage of the stream which has in the course of ages carved it out, the upper portion is wide and comparatively level, and sweeps up at a gentle incline, in a curve of considerable magnitude, to the foot of the glacier. The mountains on both sides are bare and precipitous, and their bold rocky walls give an air of desolate grandeur to the valley which impresses the imagination: but there is little else to see. The beauty of the peaks is not discernible from below, their forms, graceful and striking from a greater distance and a more appropriate point of view, from hence appear stunted, and the snowy summits barely visible, and there is no prodigality of water-falls or forest to make compensation. Thus the mountaineer, as soon as the first impression has worn off, is apt to think the Gasteren Thal monotonous, and to rejoice when the curving course of the valley above Selden brings him at length in sight of the glacier over which his path lies.

At the point where the glacier comes fully into view, the path crosses from the right to the left bank of the stream by a plank bridge, and soon afterwards loses itself on the steep hill-side. Like the majority of mountain torrents, the Kander has carved for itself a very large channel, a world too wide for its shrunk proportions at the end of a hot September; and consequently there was a broad space of gravel between the shelving bank and the edge of the water. As we came up to the end of the bridge, we

discovered a black squirrel slaking its thirst from the stream. Christian's dog, greatly excited, gave instant but ineffectual chase, and had much trouble afterwards, being inexperienced in civilized ways, in finding the bridge over which alone he could follow us. It was with great satisfaction that we witnessed the escape of the graceful little animal, which we had never before seen so near a glacier; indeed the only place where we found them numerous was the garden of the hotel at Thun, where they swarm in the beautiful woods enclosing the well-known Pavilion.

Walking diagonally on a steep hill-side strewn with stones of all sizes, and knee-deep in rhododendrons and juniper, is an operation both fatiguing and unsatisfactory at the best: but when one is condemned to winding up and down and round small shoulders, never seeming to make any progress towards an end distinctly in view, the trial of patience becomes still more severe, so as almost to render welcome a change even to that generally detested variety of walking, a steep ascent over rather loose moraine. Neither the one nor the other however last very long: a couple of hours from the bridge more than suffice to land one on the edge of the glacier, just above the magnificent ice-fall, which unaccountably dwindles into the narrow tongue of ice designated on the map the Alpetli glacier. The moraines near the left bank, though comparatively small, attract attention, being composed almost entirely of fragments of coarse pink granite; through the great hardness of the stone the fractures on many of the pieces look as fresh and clean as on the day when they were split asunder in their headlong fall.

Once on the ice, we have no appreciable further ascent to make, though the nominal top of the pass, the highest fold in the broad

undulating plain of névé, is still far distant. We were so late in the season that every crevasse was open: there was just snow enough left to give way under the tread and leave visible foot-prints. For once we could cross a wide snow-field without being roped, or feeling that we were committing the slightest imprudence in disregarding that salutary but sometimes irksome precaution. Doubtless our canine companion would have been better pleased with a smooth sheet of unbroken snow, over which he could have trotted comfortably: the constant recurrence of narrow crevasses troubled his philosophy considerably, and once or twice he had to be taken up and flung across some chasm rather wider than usual. On the whole however his performance was highly meritorious, and deserved the recognition it afterwards received, when a committee of the whole party unanimously named him Tschingel, in honour of his being the only dog in the Oberland known to have made a glacier pass.

The Swiss government, whose map in general reflects the highest credit on the energy of the *bureau topographique* and the skill of its surveyors, have recently caused the nomenclature of the whole Oberland to be revised, in accordance with the suggestions * of a committee appointed by the Swiss Alpine Club to enquire into the matter. It is to be wished that they had bestowed a little attention on the vast fields of névé over which the Tschingel Pass lies. The name "Tschingel or Kander glacier" is written right across the nearly level plain out of which, if there is any virtue in nomenclature, the Kander glacier ought to be marked as flowing into the Gasteren

* In the "Alpine Journal" for March, 1866, is a summary of the paper drawn up by this committee; the new names have been adopted in the map inserted in this volume.

Thal and the Tschingel glacier towards Lauterbrunnen: much as if "Fleet Street or Cannon Street" was written on a map of London vaguely along the whole line of street from Temple Bar to London Bridge, entirely ignoring Ludgate Hill and St. Paul's Churchyard.

Perhaps it is a matter of doubt what is the most appropriate title for this vast space: but whatever appellation it may pine in want of, there is no more remarkable snow-field in the Alps than the huge rectangular plain, comprising in its widest extent some seven square miles, which is bounded on the north-west by the long black wall of the Blümlis Alp range, and has no other defining mountains whatever. At the eastern corner rises the bold form of the Breithorn, and the Tschingelhorn and two other small rocky points rise out of the middle of the snow-field; but these in no way compress the mass of névé, which pours out its glaciers in every direction, even through one narrow gap to the north-west, where the Blümlis Alp and Gspaltenhorn stand sufficiently apart to allow the Gamchi glacier to find escape between them. It is more like in character to the vast glacier fields of Greenland than to anything elsewhere in the Alps.

As we descended towards Lauterbrunnen the view opened more and more widely at every step. With our usual good fortune we had a cloudless day, and every crag of the magnificent chain which joins the Jungfrau to the Breithorn stood out clearly against the blue firmament. Great was our regret that the camera and its indefatigable master had not accompanied us; all we could do was to speculate how high we should be able to return on the following day. The chief object was to obtain such a view of the Jungfrau as should fully disclose the Roththal and the line of ascent thence to the Sattel on the south side of the peak; and we had unwisely meditated a

laborious climb to the level of the Roththal glacier for this purpose. Now however we saw that our end could be fully attained from this the opposite side of the valley; and at each stage of our journey downwards we compared notes as to the suitability of the spot for a view of the Jungfrau, and found that we lost sight of nothing, as we approached more nearly to the haunts of men, except the frowning wall of the Blümlis Alp, which, however impressive to the imagination, is not well suited for pictorial effect.

Our four-footed friend was somewhat perplexed by the narrow ledges of the Tschingel-tritt, the rocky corner down and round which is the only convenient access from the upper level of the glacier to lower regions: but an occasional helping hand carried him safely over these difficulties, and he took to the ice again below as if it were his native element. Near the foot of the glacier we halted, fully conscious that this would be our last day on the ice, and washed down our midday meal with the clear fresh water of a glacier pool. The dog however exhibited a decided preference for wine, which he lapped with great gusto out of Christian's hand; it is unknown whether his tastes had been corrupted by his first masters, or whether he deemed himself in need of something fortifying after the labours of the day.

The Steinberg Alp, which abuts closely on the lower extremity of the Tschingel glacier, has acquired an evil reputation for the bad accommodation there supplied to travellers seeking to shorten their day's journey over one of the passes leading up the glacier. The hovels, for they deserve no better name, are filthy in themselves, and the inhabitants extortionate, a fault seldom to be found with dwellers in chalets within the limits of Switzerland, whatever may be the case on the southern side of the Alps. If some enterprising native would build a commodious mountain inn on the spot, he would certainly realize a modest fortune; the situation is incomparably finer than

Mürren, and more convenient for all excursions except the ascent of the Schilthorn, and the distance from good roads and ample supplies is but trifling.

The view from the Schilthorn, which has already been spoken of in Chapter VIII., is of course very similar to that from the Steinberg Alp, as regards its chief feature, the great mountain wall extending from the Jungfrau to the head of the Lauterbrunnen valley. Without attempting to discriminate between them, we may here note the special beauties of the lower point of view, which almost compensate for the loss of completeness in the panorama, and for not being at an elevation fully sufficient to bring out the vast proportions of the opposite range. Within a minute or two from the chalets on the Steinberg Alp, we may descend to the edge of the woods which almost fill the upper part of the valley, and frame at will our mountain pictures in settings of dark branches, or give them green foregrounds to contrast with the deeply shadowed rocks and glistening snow.

The Schmadribach also, which falls from its parent glacier immediately opposite, has a singular attraction, as if it were the one live object amid a scene of silence and death. The rush and roar of a great cataract, where a whole river plunges over a cliff into some dark gulf below, is inexpressibly grand and terrible, when we see and hear it from some spot in very close proximity: and there is grace in the thin waving line of such a fall as the famous Staubbach. But neither gives continued or unmixed pleasure. The thunder of a great body of falling water soon stuns and bewilders the senses: and there is a want of power in

> Wreaths of dangling water-smoke,
> That like a broken purpose waste in air,

which inspires a feeling almost akin to contempt. A cataract is seen

to more real advantage from a distance, as one element in a comprehensive landscape, than as the single object of contemplation, however grand the rock walls over which it dashes. An exception must be made of falls which descend like the Giessbach, almost hidden among overhanging trees: they, with the water and its rocky channel and the overarching blue of heaven, complete a picture lovely in itself, and wanting in no essential elements of beauty. Most waterfalls in Switzerland, however, descend over bare cliffs, and are visible from great distances, and these will often only disappoint if too nearly approached.

The Schmadribach is certainly one of those cataracts which are best seen from a distance, as one feature in a wide view, than from near at hand. From the foot of the Schmadri glacier—one of the steeply inclined streams of ice that creep down the face of the vast mountain wall, and terminate at a great height above the valley—issues a stream of considerable volume, which almost immediately leaps over a precipice of bare flat rock two or three hundred feet high. Seen from afar it is a broad silver line on the smooth surface of the precipice, blackened by the constant action of the water: it seems to glide smoothly down, scarcely stirred into foam, and to disappear peaceably into the narrow ravine which it has worked for itself lower down. The cliff is not absolutely perpendicular, and is quite smooth and flat: thus the torrent hardly falls, in the strict sense of the word, at all, but rather flows down the steepest possible channel—a striking contrast to the tumultuous rush of the Aar at Handeck on the one hand, and to the "downward smoke" of the Staubbach on the other. Since the actual base of the Schmadribach fall is not seen from any distance, the image of active, yet peaceful, life is not lost: it simply goes on its way, and we see it no more.

We spent the whole of a September day upon a grassy knoll a few

hundred yards from the Steinberg Alp chalets, for the purpose of photographing the opposite mountains. One or two natives, in a costume of holes bordered with rags, came lounging up, in a state of stupid wonder at our "machines," and entered into colloquy with Christian and our cheery little porter, in the usual Oberland patois, but with tones so harsh and guttural as to be scarcely intelligible. Finding that nothing was to be gained from us, they soon removed themselves from between the wind and our nobility, very greatly to our satisfaction: there being no cows on the Alp to furnish milk, they could not be useful to us, and they were very far from ornamental. We took pictures till we were hungry, and returned to the task again after lunch with equal perseverance: but photographing is not an exciting occupation for lookers-on, and all but the actual operator began to grow tired of sitting in the hot sun with nothing to do except occasionally to shift the camera or inspect a proposed picture—with no glacier upon which to work off our restlessness.

Presently Christian, ferreting among the contents of the photographic case, discovered a pack of cards, and at once suggested beguiling our leisure with the national game. This is a singular mixture of whist and piquet with some indigenous rules, and has the advantage that it can be played by two, three, or four persons. The guides never seem to tire of it, and while away large portions of every wet day in playing for infinitesimal stakes. It is called *binocle*, but the meaning of the name never dawned upon us; nor had any of us ever seen it played in England, by that or any other name. The game was not altogether new to G——, who had once before played it with an English friend and a couple of guides: but the beauty of the game was by no means evident until it came to be played by two only. In this

form it may fairly rank, after piquet and écarté, among the best games of cards for two players.

Three quarters of an hour of binocle made a serious difference in the length of the afternoon, and we returned with fresh enjoyment to the contemplation of the view. At length the sun sank behind the Tschingelhorn, having kept us in suspense till the last moment as to whether we should be able to obtain a view of the Wetterlücke, with its huge guardian peaks; and we were soon on our way down towards Lauterbrunnen. The Steinberg Alp is at some height above the bottom of the valley, on its north-western side: and almost immediately below it, near the junction of the several minor valleys which unite to form the Lauterbrunnen Thal, stands the little hamlet of Trachsellauinen, with its rustic inn. The shortest and most beautiful path between this place and the Steinberg Alp lies mainly through woods, which thickly cover the hill-side. The path is steep and rough, but the distance is not great, and the luxuriance of the vegetation renders the walk singularly delightful. There are ferns of many varieties, every species of wild fruit known to the Alps, and early in the summer a great abundance of flowers. Although nothing unusual seems to be found there, the profusion of comparatively common plants gives the place a richness and softness of scenery, which appear more natural to the Italian valleys of the Alps than to Switzerland.

The Laureate does not give us any information as to the travels of the poet whose "sweet idyll" the Princess read aloud beside her lover's sick bed: but from internal evidence he may be imagined to have been familiar with the valley of Lauterbrunnen. While we denounce the doctrine that no pleasure lives "in height and cold, the splendour of the hills," we can fully sympathize with the shepherd's desire that his sweetheart should come down from the mountain heights. Living in Lauterbrunnen, and accustomed to see the "silver horns"

of the Jungfrau and her neighbours catching the first glow of the morning light, he may well have been scared if the young lady had a fancy for taking walks upon her namesake, and was very often accustomed "to sit a star upon the sparkling spire."

He must have been an adventurous shepherd, however, to know so well what the "firths of ice" and the "monstrous ledges" were like, though his love-lorn condition rendered him somewhat jealous of their merits; and though he was quite right in warning the adventurous maid that she would not snare Love in "the white ravines," yet probably he had a very fair idea of hunting down a chamois in the same locality. Perhaps the shepherd was afraid that his lady-love, even if she did settle down as a sober matron, might retain some impulses of her former state, like the cat-bride of the fable: hence his prudent determination to withdraw her as far as he could from the attraction of the mountain-heights.

Reversing the relations of the parties, there are perhaps some English ladies who find it lonely when their husbands are moving so near the heavens, or sitting astride upon a sparkling ice-arête, and whose inclinations tend towards

> The moan of doves in immemorial elms,
> And murmuring of innumerable bees,

rather than the roar of the torrent and the thunder of the avalanche. Masculine tastes will however probably continue to prefer the sterner to the softer music; and the Alps after all abound with places where both kinds may be enjoyed, if not simultaneously, yet so near together as to produce a delightful contrast and harmony.

CHAPTER XIII.

THE FUNCTIONS OF GLACIERS.

Ye ice-falls! ye that from the mountain's brow
Adown enormous ravines slope amain—
Torrents, methinks, that heard a mighty Voice,
And stopped at once amid their maddest plunge!
Motionless torrents! silent cataracts!
Who made you glorious as the gates of Heaven
Beneath the keen full moon? Who bade the sun
Clothe you with rainbows? Who, with living flowers
Of loveliest hue, spread garlands at your feet?
God! let the torrents, like a shout of nation,
Answer: and let the ice-plains echo, God!—COLERIDGE.

THE Alps have been called, not without reason, the playground of Englishmen: they are the region to which scores of our countrymen repair, not merely for pleasure, but for health—for the pure air, the absence from care, the total change of habits, which are essential to recruit energies over-taxed in a busy life at home. It is impossible to estimate their value in this respect, to

measure the amount of benefit conferred, perhaps of valuable lives saved, by Alpine travel in any single summer. Nevertheless pleasure, from one or two different sources, is the chief object sought among the Alps, though health may also, and as it were incidentally, be gained at the same time. The pleasures of novelty, of active exertion, of mastering difficulties and braving dangers, of seeing beautiful scenery—all these may be enjoyed to perfection; and yet there is much more behind, a higher order of pleasure than

> Some vague emotion of delight
> In gazing up an Alpine height,

or even than the satisfaction of feeling the world beneath one's feet when standing on some dizzy pinnacle.

The child's instinctive dislike to the treachery which mixes up bitter powder in a spoonful of jam does not desert him in later life. People very strongly, and not unnaturally, object to being cheated into receiving instruction disguised under the form of amusement; and though fortunately they can hardly help imbibing considerable doses of knowledge while pursuing their pleasure in travel, yet many will prefer doing this unconsciously. Such persons may take their fill of pleasure in Switzerland without ever troubling themselves to speculate on the meaning of the new and grand things they see; but for those who delight to "know the reason why," and to feast their intellects as well as to gratify curiosity, the Alps are rich both in opportunities of observing the greatest phenomena of nature, and in materials for thought.

The work done by the glaciers is on so vast a scale, and the rate at which they operate so slow, that the eye can never actually see them in action. We may visit a glacier from day to day, and find the

shape of a cavity at its side altered, or the grass at its extremity dislodged by the icy plough-share—we may see the stream issuing from it thick with suspended mud which has been scraped from the glacier's bed; and we readily infer from these sights the facts of the irresistible motion of the huge ice-stream, of the manner in which it wears away the earth, and cuts ever deeper and deeper the channel in which it is confined. But this is all we can see: imagination may magnify the importance of glaciers as the sources of the main rivers of Europe, those magical currents which have developed, almost created, commerce and civilization; but reason sees that this is rather a pleasing fancy than sober truth, and that the work performed from day to day by the glaciers is of scarcely perceptible import.

The ἀριστεία of the glaciers, the day when their achievements were of supreme importance, is in truth long past: both positively, and comparatively with other agencies, they have become less prominent in the economy of nature. Great as is the work which they are now doing, if our impatience will make due allowance of time, it is simply insignificant, when compared to their mighty achievements in bygone ages. They then scooped out valleys, formed lake-beds, deposited chains of hills,—altered in fact the entire face of the earth over vast areas. Geologists are all agreed that there was once a period when not only the whole of the Alps, but great parts of Wales, Scotland, and Norway, were covered by glaciers: and though there is considerable difference of opinion as to the exact extent to which the earth's surface has been wrought by glaciers, and as to where the effect of the subsequent operation of water must be considered to begin, yet so much is universally allowed to be the work of glaciers, that it is unnecessary to enter into this controversy.

The ancient glaciers, like the Homeric heroes, tossed about with ease huge rocks which their degenerate descendants of the present

day could hardly support. High on the sides of many a valley are perched gigantic blocks, which have been carried down from some distant mountain by the glacier that once filled the valley to the brim, and to whose grinding force it probably owes more than half of its depth. As the glacial period verged towards its end, the diminishing stream of ice left these blocks stranded on the mountain side, wherever the edge of the glacier then happened to be; and though some few may have had their equilibrium undermined by rain and frost, and have fallen into the valley, most of them have remained ever since on the spot where the receding ice left them, silent witnesses to all future time of an age passed away, let us hope, for ever.

Into the vast plain of North Italy project whole ranges of hills, which are entirely composed of ancient moraines, brought down from Monte Rosa and piled on the plain by the gigantic glaciers which once streamed from the southern slope of the Alps. On a somewhat smaller scale the same phenomenon may be seen in many Swiss valleys; barriers, which in Holland would be deemed high hills, are often found running across a valley, and marking the termination of some quondam glacier. Through these huge terminal moraines, like in structure to their puny kindred in front of the Rhone glacier, a river has in general cut its way, owing its origin to the same glacier which in its former extension deposited the moraine. The picture facing page 23 shows in miniature this operation, which has been carried out in half the valleys of the Alps.

It is certain that ice-bergs do a great deal now, and have formerly done much more, in the way of carrying about quantities of moraine matter, and depositing it in places *primâ facie* most improbable. And though the balance of opinion seems at present to incline in favour of the glacier, as against the ice-berg, as the cause of the various phenomena necessarily referred to one or the other, yet there is a

certain element of uncertainty in any deduction from facts which may possibly be explained in more ways than one. More thoroughly unequivocal is the other evidence of the presence of glaciers in past ages, the polishing of the rocks by the slow grinding force of glaciers pressed violently past them, and the striations or scratchings, made on these polished surfaces by stones imbedded in the ice. It was chiefly the observation of these marks, in places where glaciers have long ceased to exist, which first led geologists to infer that there had been a glacial epoch, a conclusion now established beyond all reasonable doubt.

The picture on the opposite page represents the corner opposite the Grimsel hospice, on the left bank of the Aar, just where that river turns through a considerable angle from its original direction, and begins to descend into the Hasli valley. The cliffs, for some two thousand feet above the present level of the stream, may be seen to have been rounded and worn smooth by the glacier of the Aar: and the lines chiselled in the polished surface are also plainly discernible, running in an horizontal direction, though they are not very conspicuous in the photograph, in consequence of the small scale on which alone the picture could be taken so as to show the full height of the mountain wall. The whole mass is composed of hard granite, and has thus offered great resistance to the natural forces which have tended to obliterate the markings, since the glacier disappeared; at the same time it illustrates most forcibly the vast pressure requisite to produce them.

The inner side of a sharp curve in a valley will necessarily be a point where the glacier which fills the bottom will press with great force; and thus almost every square foot of the cliffs, part of which are here depicted, bears undoubted marks of glacier action, in the shape both of polishing of the general surface and of separate grooves. How

many ages have rolled away since the glacier of the Aar, diminishing in size and depth, left those marks bare to view, it is impossible to

STRIATIONS OPPOSITE THE GRIMSEL.

calculate, useless even to guess : the tendency of every new observation or inference seems to be towards extending the time indefinitely.

The fiercest heat and the severest frost of countless alternating seasons, the continual trickling of rills and of raindrops, the mighty roll of avalanches, and the scathing lightning—all the forces of nature have beat during countless centuries upon that exposed corner; and yet those minute groovings remain perfectly distinct:—

> Neither heat nor frost nor thunder
> Shall wholly do away, I ween,
> The marks of that which once hath been.

It may seem at first sight strange that stones imbedded in a glacier should thus groove the solid rock, that they should not rather themselves be driven into the substance of the ice. And though it would not be hard, by dwelling on the enormous pressure operating on the glacier, to remove this apparent objection, yet the legal proverb that an ounce of fact is worth a pound of law, offers us a still easier way out of the difficulty. The same process is now going on almost under our eyes, and its effects may be witnessed wherever the diminution of any glacier leaves exposed to view rocks which until lately were covered by the ice. There is probably no place in the Alps where these markings can be seen so fresh or so numerous as beside the Unter Grindelwald glacier, whose rapid shrinking of late years has uncovered very large surfaces of rock, most remarkably polished and striated. Enough has already been said in Chapter V. to indicate accurately the places where these markings may be seen to the greatest advantage, and where we obtained the photograph which is given on the opposite page.

The alternations of frost and heat have had as much effect in two or three years, in disintegrating the rocks here depicted, as many ages have had on the unyielding granite of the Grimsel; and it is not

impossible that a comparatively short time may destroy all traces of the groovings now so conspicuous. The slaty texture of the stone visible in the picture will not take so fine a polish as harder and more homogeneous rocks: but the scratches are perhaps for that very

STRIATIONS BESIDE THE UNTER GRINDELWALD GLACIER.

reason more fresh. There is a roughness about the grooves which seems to suggest the appearance of lines drawn upon a common writing-slate, hard enough to cut into its surface. Many yards of rock in the same neighbourhood were marked in a manner similar to that shown in the illustration: and in one instance we found the ice

moving along a smooth surface of stone, in such a way as to leave a part bare behind it. Unfortunately however the colour of the rock, and the uneven state of the glacier beside it, rendered it impossible to obtain a satisfactory photograph: if we could have done so, it would have exhibited together the working tool and the effects produced.

If glaciers can thus carve and polish solid granite, it may easily be imagined that their power is gigantic, when exerted against softer materials. It would almost seem as if every valley in the Alps, and many in other parts of Europe, had been originally formed by glaciers, whose steady pressure has worn channels for themselves to move in. We must not however suppose that the Alpine valleys have been moulded to their present form by this one agent: the glaciers have done the rough-hewing, and have left it to finer instruments to complete the work. Ever since the disappearance of the ancient glaciers water has taken their place, and has been operating to deepen the main valleys, to form the lateral ones, and to deposit the various strata in which vegetation can find sustenance.

The extent to which the earth's surface has been eroded by water can scarcely be conceived without a strong effort of the imagination. Those who maintain that the deep valleys were originated by fractures in the earth's crust still invoke the aid of water to produce all the details of the surface, while the opposite school, which seems to be obtaining every day wider acceptation, believes that the valleys are due to the erosion of ice in the first instance, and subsequently of water. Professor Tyndall has pointed out appearances which seem to lead irresistibly to the conclusion that the deep gorge of the Via Mala has been entirely worn by water; and many another narrow ravine, which at first sight appears to be a crack in the surface of the earth, betrays on closer examination tokens that the same agent has wrought them.

The operations of water, as of the ancient glaciers, can be traced by those who have learned to read their hand-writing, rather in the lower valleys than in the icy solitudes above. Nevertheless we may learn much concerning them by observing phenomena which are offered to our inspection on the surface of almost every glacier: the superficial streams cut into the substance of the ice just as water does into the earth, but so much more rapidly that we are enabled to see not merely the results, but the work in actual progress. These models of mightier streams have the further advantage that we can artificially direct or alter their course, and thus see what effect is produced by the occurrence of natural obstacles interrupting the straight flow of a river.

At one spot on the Aar glacier we found a surface-stream which had worked for itself a curiously winding passage, in descending an abrupt fall of three or four feet, so that the remaining ice looked like the convolutions of a gigantic shell—a delusion heightened by its extreme hardness, which gave the thin layers of ice a colour almost like mother-of-pearl. We cut a gap through the shell of ice, just low enough to permit a little water to flow directly over out of the pool formed at the head of the narrow outlet: when we visited the place next day this gap had been worn into a deep cleft, through which all the water of the stream poured, leaving the original passage entirely dry. What our axes effected in this case for the tiny glacier rivulet, art has often done with larger streams; and natural agencies still more frequently, in the ages when the earth's crust was being moulded into form, undisturbed by the necessities and the ingenuity of man.

This is one instance out of many slight influences which we may trace, visibly determining the course of a glacier stream, and corresponding to similar forces which have directed the course of

rivers. Ice is not usually homogeneous, as the veined structure has shown us: and the various rocks which constitute the earth's crust are even less so, while they differ from one another immensely in density. If the resistance be equal all round, the water will naturally flow straight forward in the direction in which it is already impelled, and a straight channel will gradually be formed. If on the other hand some parts exposed to the action of the water be less coherent than others, the looser material will give way more readily, and the stream will take a corresponding bend in the direction of least resistance. And since ice is in general composed of layers very unequal in hardness, we usually find glacier streams winding in a manner apparently most inexplicable and fantastic, though every curve has its definite cause, which in many instances can be perceived without much trouble.

As a general rule it may be stated that the nearer a glacier is to its end, the straighter will run the streams which drain its surface. For the ice in the course of its journey downwards is more and more squeezed into perfect hardness: the veined structure often is found to disappear before the termination of a glacier is reached, through the whole mass of the ice having assumed the consistency of the blue veins. The causes which will suffice to deflect a glacier stream are however so trivial that this rule scarcely admits of more than theoretical application, being qualified in practice by very numerous exceptions. A stone lying on the ice will serve to change the direction of an entire stream. The slightest crack will probably swallow it up. And since the same holds good of brooks and rivers in their degree, we see how infinitely complicated is the vast problem to be worked out, if we would comprehend the manner in which water alone has sculptured the surface of the earth.

The accompanying picture represents a glacier-stream upon the Eismeer, running along the right side of the huge central moraine. The view is taken looking up the stream, which makes a very considerable bend just above; and the channel cut out by the water is a

GLACIER STREAM ON THE EISMEER.

fair typical representative of the general shape of many an Alpine valley. On each side there are precipitous walls, formed as the stream gradually cut its way down into the ice: then the supply of water dwindled away, and the diminished rivulet, instead of covering the whole channel, has begun to cut a narrower and deeper gully along

the old bed, leaving part of it dry. In some places the bounding walls retain their smooth and perpendicular form, in others they have been partly wasted away by the sun and air, just as rocky cliffs are disintegrated, the only difference being that the débris of the ice-walls was water, and therefore disappeared at once, instead of being piled against the foot of the cliffs. The stones which lie in the stream are scarcely large enough seriously to affect its flow, though we may trace the influence of some of them, where they have driven the water against the ice-bank, so as partially to undermine it.

The causes which have directed the course of this stream may also be easily seen. Under a central moraine, as has already been noticed, the ice, through the severe mutual compression of the two united glaciers, is apt to be harder than elsewhere: at the same time the elevation of the moraine above the average surface tends to produce some little depression along its base. A surface stream naturally flows along the lowest part of the surface, and is further unable to penetrate the harder ice close under the moraine: thus it winds along, like a natural moat, beside the moraine, the general direction of its channel being governed thereby. The sharp bend visible in the picture is the cause why lower down the stream flows close to the moraine instead of on the other side of the channel: from the outer side of the curve the water is forcibly repelled, and is driven across to the opposite bank.

There are three great instruments which the Creator has used in moulding to its present condition the surface of the earth, and which will doubtless continue to work, and perpetually to modify the existing forms, so long as the earth subsists. These potent tools are ice, water, and fire. The Alps show us but little of the agency of the last, except that the granite ranges, whose substance has undergone

no change since it cooled down from being a molten flood, here rear their naked fronts above the later formations. It is possible, though the balance of inference is against it, that some of the Alpine valleys were originally formed by some natural convulsion, which must have been caused by the heat of the central fires : it is possible also that the granite mountains may have boiled up, so to speak, in their present position, through a crust of other and later formation. But on the whole there is little visible among the Alps which can be referred to the power of heat directly, or in any other sense than is applicable to the entire crust of the earth.

Of what ice can do the glaciers show us half, and the most important half ; for though almost every country whose geology has been investigated bears traces of deposit left upon some part of its surface by primæval ice-bergs, yet even these ice-bergs, if they carried drift, must have received their cargo while portions of a glacier, just as the Greenland ice-bergs do at the present time. Moreover the glaciers, if they really formed all the valleys, thereby determined to a great extent the course of the rivers, and consequently the chief localities of human population and the directions of early human intercourse. To realize the transit of ice-bergs over what is now dry land requires an effort of imagination beyond ordinary reach, though we may easily believe the fact : the glaciers we can see almost with our own eyes doing work the same in kind, though not nearly so great in quantity, as that which they were appointed to do in the glacial epoch.

The action of water also we may easily trace in almost every Alpine valley, while the streams which carve the surface of glaciers have afforded us a sort of working model of the operations of water on a larger scale, and on less yielding material ; and the combined effects of heat, frost, and rain, acting in rapid alternations on the exposed

peaks, have given them their fantastic details of form. We need seek no better place, if we desire to see the powers of nature most visibly working, than

> The high mountain platforms
> Where morn first appears,
> Where the white mists for ever
> Are spread and upfurled,
> In the stir of the forces
> Whence issued the world.

The earliest rock forms are seen among the Alps in all their bare simplicity, and many of the successive stages in the growth of the earth's crust, from the primal granite down to the latest alluvial deposit, are there exhibited. We may almost trace the course of the changes, and see all the fundamental principles of geology, in the widest sense of that term, exemplified before our eyes. And although we cannot estimate the time which must elapse before we may hope to have learned the complete history of the earth, if ever that day should dawn, yet we can readily see how valuable are the Alps to us, an always open book in which we may study some of the most important chapters in that long and mysterious history.

A glacier is so marvellously unlike any of our home phenomena, and the forms of the mountains are so vast in size and stupendous in their effect on the imagination, that it excites a strange complication of feelings when we realize the truth that they were produced by the same forces which have constituted our own tamer and more peaceful land, nay more, that they are the results of simpler and more elementary operations of those forces. At first we begin to fancy that "the riddle of the painful earth" is not so hard to solve after all. If the grandest phenomena of nature arise from causes with

whose workings we are every day familiar, and which we daily set in motion to suit our particular needs, the human intellect ought to be capable not only of understanding the principles upon which the world has been formed, but also of directing the natural forces at will.

Further reflection shows us that though we have seen aright that the grandest and the most ordinary things in nature are more nearly akin than at first they appeared, yet we ought in consequence to exalt our estimate of the smaller, not to disparage the greater phenomena. When our attention has been roused by wonders on a larger scale, we learn to appreciate the mysteries, unnoticed before because too familiar, which underlie the commonest things of daily life.

The great principle of the Conservation of Force, and the subsequent discoveries which tend to show that all the natural agencies are but different manifestations of one and the same fundamental power, while they bring us nearer to understanding the mysteries of the universe, and inspire a hope that man may some day be able to discern the whole wondrous plan of creation, nevertheless tend, like everything great in science, to exalt our conception of the infinite wisdom and power of the Creator. Man can translate one form of force into another, produce motion by the consumption of heat or electricity, or evoke heat by suddenly arresting motion; but he is powerless to *create* any power whatever. The whole sum of force requisite for every natural change, or capable of being wielded by human will, exists already in some shape, and nought that man may do can add to its amount or diminish from it. God alone has created the entire motive power of the universe, and given the original impulse to the mighty machine: and whether we believe that He continues actively to guide and superintend its working, or hold that

He has once for all imposed upon it the immutable laws of its being, in neither case is the one great fact obscured.

The deeper we penetrate into the *arcana* of nature, so as to discern "the law within the law," the more clearly do we perceive that above and beyond all law rises the supreme will of the Almighty lawgiver. Those very geological periods, whose incalculable length stretches backwards over the world's history to a beginning which every new enquiry seems to set further off, are the strongest evidence of the eternal wisdom of the Creator. The first discoveries that proved the earth to be of immense antiquity led the presumptuous to deny the truth of a divine revelation, which seemed to contradict the conclusions of science, and the bigoted to disbelieve the truths of science because they appeared to be at variance with revelation. Time and thought have removed this mutual distrust: and the man of science is often the most truly religious, because he has the best appreciation of the infinite wisdom and power involved in the work of creation.

Familiarity with the wonders of the Alps is among the best means for originating and deepening such impressions: for their gigantic size and awful phenomena tend to produce an effect not merely on our intellectual perceptions, but also upon the moral feelings.

The mountain-ranges are to us monuments of pre-historic ages, when a solid crust first formed over the molten earth, and the glaciers are the visible instruments of the Creator in transforming that barren globe into a smiling world fit for the habitation of man; but peak and glacier may also well serve as emblems of even higher things than these. Not without reason did the prophets of Israel "lift up their eyes unto the hills," and the poets of Greece seat their deities in Olympus and Ida: there was some meaning in the Oriental belief

that the mysterious Mount Kâf was the boundary of the mortal world. It is not merely that the peaks point heavenwards more majestically than any Gothic spire, or that the thunder of the avalanche and the *berg-fall* speaks of Almighty power. The "mystic mountain-range," gleaming on the horizon across a vast intermediate distance of plain and lower hills, seems to form a barrier beyond which the world can extend no further; towering up from no visible base, it appears to pierce the very skies, while its perfect whiteness and stillness makes it no unfit emblem of heaven, the home of everlasting purity and peace, rising above the dark shadows and busy contentions of this lower world.

> Well may'st thou stand and worship—earth can show
> No worthier temple than yon spires of snow—
> Worship the God, whose silent presence fills
> The awful solitude of yonder hills:
> He built them, emblems to man's sight and sense
> Of power supreme, immutable, immense.

Principal Forbes* has instituted with much poetic force a comparison between the course of human life and the history of a glacier. "Heaven-descended in its origin, it yet takes its mould and conformation from the hidden womb of the mountains which brought it forth. At first soft and ductile, it acquires a character and firmness of its own, as an inevitable destiny urges it on its onward career. Jostled and constrained by the crosses and inequalities of its prescribed path, hedged in by impassable barriers, which fix limits to its movements, it yields groaning to its fate, and still travels forward,

* Travels in the Alps of Savoy, p. 387.

seamed with the scars of many a conflict with opposing obstacles. All this while, although wasting, it is renewed by an unseen power—it evaporates, but is not consumed. On its surface it bears the spoils which during the progress of existence it has made it own—often weighty burdens devoid of beauty or value; at times precious masses sparkling with gems or with ore." These external things do more than accumulate as a burden or an ornament; they often act as a disguise, and cover the surface with a clothing foreign to its real nature; but within the substance remains the same, such as its original creation rendered possible, and its subsequent workings have developed, firmer and more consistent for every struggle it has gone through. Some men there are who still further follow the pattern of the glacier, and emerge from every trial clearer and purer inwardly, until at the close of their career they shine like one entire and perfect chrysolite.

Sometimes many and strange vicissitudes are encountered; sometimes its course continues smooth and equable to the destined end, untried by difficulties and unbroken by opposition. Now it is seen

> Shooting o'er some verge, to make a short,
> An angry and precipitate descent,
> Thenceforward much tormented on its way—

and to terminate prematurely, amid distraction and confusion. Another's career is long; passing perchance at an early period through straits in which its youthful freshness is destroyed, it escapes into comparative quietude and freedom, and moves slowly on to a far distant end, to expire at length, perhaps in obscurity and contempt, perhaps in all the splendour due to a pure career.

Each alike however ultimately terminates in the same manner, in the dark sepulchral cavern whence a new being, the same in personal identity, but changed and exalted in nature, emerges to a nobler and freer life.

NOTES BY THE PHOTOGRAPHER.

A KNOWLEDGE of the general results, if not of the practice, of the art of photography is now so widely spread, that a few brief notes as to the means employed to obtain, and to surmount the difficulties that were met with in obtaining, the somewhat unusual series of photographs which constitute the illustrations to this work, may be interesting to many of its readers; and in writing these I have endeavoured, by the use of as few technical terms as possible, to make myself intelligible to those to whom the practice of photography is a dead letter.

In selecting the apparatus for my purpose, from the nature of the work to be done, two objects were required to be kept in view, first that it should be as light and compact, and next that it should be as strong as possible. These difficulties were not lessened by the decision which had been arrived at, that it was necessary to provide for taking pictures of at least three different sizes, and that the smallest number of negatives to be taken of each view should be four.

By very careful planning, by the saving of every ounce of weight and every inch of space that was not actually needed, the whole of the apparatus, including no less than eight different lenses, with a supply of chemicals and plates for three days—and such toilet requisites as were necessary for my own use—were stowed in two small

cases which could readily be carried by one man, the "legs" of camera and tent being extra.

The first case comprised the dark tent, which was a modification of form known as Edwards', and may be thus described:—The outward shape presented the appearance of a wooden knapsack, being complete in itself, with the exception of its stand, which was carried along with the camera legs. On its being placed on its stand and prepared for action, this process occupying about three minutes, the operator finds the lid of the box transformed into a washing tray, from which a pipe carries away the waste to the ground; at his left hand is the nitrate bath let down into a bag, the top of the bath being about an inch above the surface of the tray; and to prevent any chance of any foreign matter entering this, a waterproof covering is provided. In the upper left-hand corner are placed the various bottles of chemicals, each in a cell to itself, and comprising two six-ounce bottles (glass) of collodion, bottles of iron and pyro developers, silver solution for deepening, and cyanide for fixing (all in gutta-percha bottles) besides developing glasses, dusting-brush, and blotting-paper. Immediately under these is a cupboard exactly the size of the plates used, viz., eight inches by six, arranged for the reception of them in a partly finished state, where they may be kept damp till the end of the day, or till a convenient opportunity arrives for their completion. By the method employed in the construction of this cupboard, I have on occasion, and during summer, kept plates wet for three days. This arrangement proved to be of great value. The importance of making the most of good light cannot be overrated, and by this means I have been enabled to take as many as twelve subjects in one day, striking my tent for this purpose six different times, and getting over as well a considerable distance of glacier walking. Moreover, a very large amount of water is required for finishing the plates; and though this can usually be obtained in abundance on the surface of a glacier, yet this advantage ceases on going beyond the snow line, or up such mountains as the Sparrenhorn and Torrenthorn, whence were taken the views given in Chapter VIII. In all such places I found it essential to economize to the utmost the scanty store of water which could be carried with me, or I could not have obtained half the pictures actually taken; and to this end

the arrangement for keeping the plates in a damp state materially contributed.

To continue the description of the tent; opposite the operator again, but at the right-hand side, is a large window of three thicknesses of yellow "tammy" or calico, which can be easily opened and shut from the inside, the box itself at this part forming the shelf on which to put stray bottles and developing glasses; and finally hanging from the right-hand corner is an elastic tube with an ingenious tap, which conveys the water supply from a large zinc cistern placed outside on the top of the tent, where it can be filled and refilled at pleasure. The operator having seated himself on his camp-stool, which folds up and goes with the legs, has merely to draw over himself the light proof covering attached to the tent and kept in its place by two very light iron rods, to commence his work. He will find everything in its place and everything to his hand, with plenty of elbow and head-room to go through or modify his operations at will. When the tent is packed up, both the nitrate bath and the water-tank find places among the other apparatus within the case.

This arrangement made for working eight-by-six-inch pictures, measures 13½ by 17 by 6¼ inches, and weighs with a full complement of chemicals, and *every* necessary except the camera and legs, 17 lbs. It would be perfectly simple to arrange for the camera also being carried in it; but I have not found this advisable or convenient for this reason. On arriving at a promising subject the camera only is first put up; the selection of the view is then made; and this, which is seldom effected without a good deal of consideration and running about, being decided on, the tent is unpacked as near to it as may be convenient. It being important to save frequent shifting of the tent, we generally pitched it, if possible, at a place near which several views were wanted; and since it was not safe to convey the prepared plate a greater distance than about three minutes' walk, we had to choose a central spot between three or four points of view. During all this delay the tent remained packed up, avoiding the possibility of any accident to its contents; and if, as occasionally happened, no suitable view could be found, the camera only had to be repacked. Moreover, we generally found it possible to carry about the camera, after the first pictures of the

day had been taken, without re-packing, it being fixed so firmly on its stand as to travel very easily, tilted over a man's shoulder like a sloped rifle. And then it could be set down, and a proposed view examined through it, without a moment's delay.

I have been thus particular in describing this pet tent because experience has convinced me that success in landscape photographing greatly depends on the photographer feeling himself at ease in his tent—the feeling generally being that of a make-shift. I lay claim to nothing particularly original in this arrangement—it is merely a collection and adaptation of a number of small improvements which are but trifles, but tend to make up a perfect whole which is no trifle.

The second small case was made of leather, and in it was carried the camera, which was one of Kinnear's form, and constructed to take either a single picture of the full size, eight by six inches, or two pictures six by four inches, or four pictures four by three inches on each plate—the lenses, which were Grubb's aplanatic landscape lenses, than which none can be better—the plate-box, with nine grooves, each holding two plates back to back—a focusing-cloth, a macintosh, and when necessary, a small extra supply of chemicals—still leaving sufficient room for personal requisites. Thus my whole travelling material was in three very manageable packages, the tent, the camera, and the legs.

In addition to these, a stock chest of chemicals and plates had of course to be carried about from one "head quarters" to another; and many times have I quaked with fear on seeing it start off, shaking like a jelly, on the back of horses, of whom it would be complimentary to say they had, as an average, three sound legs apiece. Thanks to good packing, however, it survived all perils undamaged.

The collodion, perhaps *the* most important element in the photographer's outfit, was "Rouch's ordinary bromo-iodised," and by iodising it some weeks, and carefully decanting it before starting, a very uniform and satisfactory preparation was obtained.

The developer was a very weak solution of iron, sometimes not more than a grain to an ounce of water, with a good dose of restraining acid. Even under these conditions, and using the smallest stops supplied with the lenses, the exposures were found to vary from one

to ten seconds only. It is to be remembered, however, that I was photographing in the middle of vast snow-fields, from which the glare was so great as to render necessary, to make the light even bearable, the wearing of coloured glass spectacles; and sometimes in addition, linen masks as a protection for our faces. After the application of this weak iron solution and a careful washing, the negatives were stored away in their dark box in the tent, and in this state kept till the day's work was over, when they were all deepened together with the ordinary pyro and silver, and fixed with a very weak solution of cyanide.

The off days were spent in varnishing and overlooking our harvest of negatives. Working entirely by myself and without any assistance except in packing and unpacking, and in fixing the camera for the different views, a work in which my friend of the pen gave me frequent aid, varnishing was the only process that I ever found in the least irksome. I should, on another occasion be disposed to leave this process till my return home, storing the negatives away as they were taken in grooved boxes.

The reason why glacier scenery is so well suited for representation by photography, namely that except in detail it exhibits no great variety of colours, causes at the same time one of the great practical difficulties in obtaining the pictures. On a sunny day the contrasts of light and shade are so violent that shadows are too apt to come out very nearly black in a photograph. The Frontispiece affords a good instance of this; the contrast between the glaring white of the ice-fall and the dark rocks on either side was so marked that it was only by the use of exceedingly weak solutions that any picture at all could be obtained, and even thus the triangular shadow cast by the Schreckhorn is so dark as almost to obscure the meaning of the view.

In photographing the picture with the title "Ice Needles," as in many of the others, it was really a matter of very considerable difficulty to find a stand-point for the camera. This may be inferred from the character of the surroundings, and when a spot had at last been selected, and the camera planted with its feet resting in notches cut in the ice, I could not repress a nervous anxiety, in returning to the camera with a plate ready for use, lest in my brief absence it should

have disappeared bodily down a crevasse. I must admit, however, that my fears on this head gradually wore off, as I became acquainted with Almer's power over ice, and his great care in making everything safe, both for me and for the camera.

It has once or twice been suggested to me that the photographs would have been improved by the more frequent introduction of a figure. In most cases, as in that of the ice needles, this was obviously impracticable. In the Frontispiece again, or the view from the Torrenthorn, about a day's journey would have been necessary for anyone who wished to be thus immortalized to appear in the picture at all—and even then the figure would not have been discoverable, as it would have been in size somewhat less than the eye of a needle.

The two photographs entitled the Active and Extinct moulins were not captured without some little risk. In the former case I had to be let down into the bed of the glacier stream, with the pleasant reflection that at any moment a large boulder, some of which are seen lying about, might interrupt my proceedings. In the latter a way had to be cut in the ice, and both camera and artist had to be held (the latter by his coat tails) for fear of both disappearing for ever.

I was fortunately free from one annoyance to which, when photographing in cities and amongst men, one is only too liable, the difficulty on the one hand of preventing people from walking across at the critical moment, and on the other of restraining the curiosity of those who *will* look into the camera. But even on the mountains we sometimes had occasion to retrain the curiosity of sheep and goats, who were for making too near an acquaintance with my camera and tent.

The character of the skies is as fairly represented as it is possible for a photographic picture in mere black and white to reproduce them. They were in truth so strongly contrasted in their deep blue with the pure white of the snow-fields, that they appeared at times by comparison to be quite black. In the view of the Nesthorn this contrast is especially noticeable; and it is, I think, a leading feature in the truth of Swiss photographs. Whilst at work I longed to be able to reproduce the infinite variety of tints with which the sun lighted up the ice. A photograph, however good it is, can give no conception of this wonderful play of colour, and this was especially the case with

the final picture, where the sunlight filled the cavern with a thousand different hues.

In such subjects as the Striations or the Dirt-cone this want is not felt, and nothing could be more faithful than the way in which these phenomena are displayed. For subjects in which picturesque effect is not expected, where nothing is required but a simple reproduction of the facts of nature, the photographic art is perfectly adapted; in pictures of a more ambitious kind she must be content with more qualified success, with accurate representation of form, and such truth of effect in light and shade as can be obtained by a judicious choice of direction, and proper management of her chemical instruments.

UNWIN BROTHERS, PRINTERS, BUCKLERSBURY, LONDON.

00060383

Digitized with financial assistance from the
Government of Maharashtra
on 18 July, 2018